Pit and Quarry

With which is consolidated CEMENT-MILL & QUARRY

Member Audit Bureau of Circulations

Read in Largest Number of Plants

Vol. XXI December 17, 1930 No. 6

In This Issue

Efficient Design Enables Four Workmen to Handle Entire Production 16

Erects Crushed-Stone Plant to Furnish Ballast on 3-Year Contract 23

Seven 120-Foot Cement Kilns Replaced by One 305 Feet in Length 25

Produces Rock Salt from Bed 1,100 Feet Below Surface Near Detroit 29

A Study of Crawler Tractors as Applied to the Pit and Quarry Industry 34

How Two Crushed-Stone Producers Save Money by Preventing Accidents 39

Design of Massachusetts Gravel Plant Saves Wear on Conveyor Belt 44

Entire Sand-and-Gravel Plant Moved to New Deposit in Slack Season 46

Mechanical Processes Used Throughout in New German Limestone Plant 51

Canadian Feldspar Plant Supplies Raw Material to Ceramic Industries 53

Speed Regulation of Rotary Kilns in German Portland Cement Plants 57

Men of the Industry 61
Personal Mention 62
Coming Events 63
Financial News 64
Traffic News and Comment 65
Review of Foreign Practice 67
Recent Patents 68
Pumpings from the Old Pit 69
Legal Information 70
Insurance Problems Discussed 71
New Machinery and Supplies 72
Manufacturers' Publications 77

Next Issue December 31, 1930

Published bi-weekly on Wednesday for producers and manufacturers of Sand, Gravel, Stone, Cement, Lime, Gypsum and other non-metallic minerals. Entered as second-class matter October 9, 1928, at the Postoffice at Chicago, Ill., under the Act of March 3, 1879.

Copyright, 1930, by
COMPLETE SERVICE PUBLISHING CO.
538 South Clark St.
Chicago, Ill.

H. W. Baumgartner, *President*
V. E. Larsen, *Vice-President*
S. A. Phillips, *Directing Editor*
Arthur J. Hoskin, *Editor*
W. E. Trauffer, *Asst. Editor*
Harry F. Utley, *Asst. Editor*

New York Representatives:
E. M. Buck, 68-43 Clyde St.
Telephone *Boulevard 5259*
Forest Hills, L. I., N. Y.
V. A. Leslie, 301 W. 108th St.
Telephone *Academy 7990*
New York, N. Y.

Cleveland Representative:
W. E. Coates, 2198 Elbur Road
Telephone *Boulevard 0688W*
Lakewood, Ohio

Subscription price: $5 for 3 years, $2 for 1 year in the United States and possessions, North, Central, and South America; elsewhere $1 additional for each year. Single copies 20 cents.

Pit and Quarry

With which is consolidated CEMENT-MILL & QUARRY

Member Audit Bureau of Circulations

Read in Largest Number of Plants

Vol. XXI December 17, 1930 No. 6

In This Issue

Efficient Design Enables Four Workmen to Handle Entire Production 16

Erects Crushed-Stone Plant to Furnish Ballast on 3-Year Contract 23

Seven 120-Foot Cement Kilns Replaced by One 305 Feet in Length 25

Produces Rock Salt from Bed 1,100 Feet Below Surface Near Detroit 29

A Study of Crawler Tractors as Applied to the Pit and Quarry Industry 34

How Two Crushed-Stone Producers Save Money by Preventing Accidents 39

Design of Massachusetts Gravel Plant Saves Wear on Conveyor Belt 44

Entire Sand-and-Gravel Plant Moved to New Deposit in Slack Season 46

Mechanical Processes Used Throughout in New German Limestone Plant 51

Canadian Feldspar Plant Supplies Raw Material to Ceramic Industries 53

Speed Regulation of Rotary Kilns in German Portland Cement Plants 57

Men of the Industry 61
Personal Mention 62
Coming Events 63
Financial News 64
Traffic News and Comment 65
Review of Foreign Practice 67
Recent Patents 68
Pumpings from the Old Pit 69
Legal Information 70
Insurance Problems Discussed 71
New Machinery and Supplies 72
Manufacturers' Publications 77

Next Issue December 31, 1930

Published bi-weekly on Wednesday for producers and manufacturers of Sand, Gravel, Stone, Cement, Lime, Gypsum and other non-metallic minerals. Entered as second-class matter October 9, 1928, at the Postoffice at Chicago, Ill., under the Act of March 3, 1879.

Copyright, 1930, by
COMPLETE SERVICE PUBLISHING CO.
538 South Clark St.
Chicago, Ill.

H. W. Baumgartner, *President*
V. E. Larsen, *Vice-President*
S. A. Phillips, *Directing Editor*
Arthur J. Hoskin, *Editor*
W. E. Trauffer, *Asst. Editor*
Harry F. Utley, *Asst. Editor*

New York Representatives:
E. M. Buck, 68-43 Clyde St.
Telephone *Boulevard 5259*
Forest Hills, L. I., N. Y.
V. A. Leslie, 301 W. 108th St.
Telephone *Academy 7990*
New York, N. Y.

Cleveland Representative:
W. E. Coates, 2198 Elbur Road
Telephone *Boulevard 0688W*
Lakewood, Ohio

Subscription price: $5 for 3 years, $2 for 1 year in the United States and possessions, North, Central, and South America; elsewhere $1 additional for each year. Single copies 20 cents.

Pit and Quarry

With which is consolidated CEMENT-MILL & QUARRY

Member Audit Bureau of Circulations

Read in Largest Number of Plants

Vol. XXI CHICAGO, DECEMBER 17, 1930 No. 6

Fifty Cement Plants in Race for Trophy

SAFEST YEAR IN HISTORY SEEN

The Portland-cement industry is anticipating a greater reduction in accidents during 1930 than in 1929. Last year this industry had the lowest accident rate in the twenty-seven principal American industries. Figures released by the Portland Cement Association recently show that during the first ten months of 1930, lost-time accidents have been reduced almost 26 per cent below those of the same period of 1929, and a greater reduction of nearly 44 per cent has been made in fatal accidents.

The total of lost-time accidents among cement workers was 578, and fatal accidents 35, between January 1 and November 1 of 1929. These totals during 1930 were reduced to 436 and 20, respectively.

A consistent accident-prevention program has been responsible for the steady elimination of mishaps during the last several years. Annually, since 1924, figures show, both lost-time and fatal accidents have shown a definite trend downward. As a result, the cement manufacturers of the country are finding the happiness of their employes and the efficiency of their plants considerably increased.

Fifty cement plants were, up to November 1, still eligible for the Portland Cement Association safety trophy, which is given each year to companies operating without a single lost-time or fatal accident.

Lehigh Cement Resumes Production in Far West

The Metaline Falls, Wash., plant of the Lehigh Portland Cement Co. resumed operations early this month, according to Superintendent H. H. Helwig. The plant had been closed down since about the first of May this year.

Since the closing down of the plant, two air separators which will increase the capacity of the plant and at the same time produce a product of finer and improved quality, have been installed. The new additions required an extension of one of the plant buildings and the improvement cost approximately $50,000. During the shutdown an effort was made to clean out all the old stock and what is manufactured from now on will be of the higher standard and finer grind.

About 60 men are employed.

New Buffalo Slag Plant to Operate in January

The new slag plant of the Buffalo Slag Co. at Lackawanna, N. Y., construction of which started early in 1930, is now almost completed and will be ready to operate some time in January, 1931. This plant replaces the old Plant No. 2 which is being abandoned and will itself be known as Plant No. 2. Some of the machinery from the old plant is being used in the new, with additional new machinery to increase its capacity and improve the quality of the product.

Federal Gypsum Bought by U. S. Gypsum Co.

The United States Gypsum Co. of Chicago has acquired the plant and properties of the Federal Gypsum Co. at Centerville, Ia., and will continue production of its plaster and lime products with plans for future expansion of the plant and diversification of its products.

The unit will be operated as the Federal Gypsum division and there will be no change in personnel or management. T. R. Parrish, comptroller, and T. H. Kassner, division production manager, concluded details of the transfer. W. S. Bradley was recent owner of the plant.

Three Granite Quarries in Merger Negotiations

The Westerly Pink Quarries, Inc., in which the principal stockholders are Orlando R. Smith, Franklin C. Smith, Isaac G. Smith and Edward W. Smith, is negotiating for a merger with the Smalley Pink & Red Westerly Co., and the pink granite quarries of the Smith Granite Co. All three concerns are located at Westerly, R. I.

Sand-and-Gravel Plant in Utah Being Improved

Improvements to the sand-and-gravel plant and equipment of Owen Dean & Sons, American Fork, Utah, are now in progress. When complete the plant will be one of the most modern in the state, it is declared.

Iowa Aggregates Men Oppose Wage Cutting

SUPPORT HOOVER PLAN FOR 1931

The Iowa Aggregate Producers Assn., composed of crushed-stone and sand-and-gravel dealers of Iowa, in session at Hotel Fort Des Moines, in Des Moines last month, adopted a resolution indorsing President Hoover's appeal to employers to maintain a wage scale in 1931 equal to that of 1930.

The resolution, which was transmitted to the president, Gov. John Hammill, Governor-elect Dan Turner and members of the next Iowa general assembly, points out the belief of the aggregate producers that "only by maintaining a living wage to labor can we expect an early return to normal conditions."

R. C. Fletcher, former president of the National Sand and Gravel Assn., and a prominent Iowa producer, pointed out that the aggregate dealers of Iowa employ a large amount of labor and that their combined pay roll runs into several hundred thousand dollars annually. He said they have steadily maintained their wage scale in spite of the fact that volunteer laborers were willing to work for a much lower figure.

E. W. Gray of Des Moines, president of the Iowa Aggregate Producers Assn., and S. P. Moore of Cedar Rapids, secretary and treasurer, emphasized that the organization is not asking other employers to do something which the association is not already practicing among the workmen in its own ranks.

The complete text of the resolution follows:

"We, the producers of crushed stone, gravel and sand, represented by the Iowa Aggregate Producers Assn., as employers of a large amount of labor, indorse the general policy of President Hoover in his appeal to employers to maintain a wage scale in 1931 equally as good as 1930.

"We commend other employers who indorse this same policy, as we sincerely believe that only by maintaining a living wage to labor can we expect an early return to normal business conditions."

November Contracts Are Below October's

AWARDS FOR MONTH $253,573,700

November contracts for new construction of all types awarded in the 37 states east of the Rocky Mountains totaled $253,573,700 according to F. W. Dodge Corp. This compared with $337,301,400 in October and $391,012,500 in November, 1929. Of the November, 1930, total, $101,096,000 was for new non-residential buildings; $80,781,900 for residential structures; and $71,695,800 for public works and utilities. Total new construction contracted during the eleven elapsed months of 1930 was valued at $4,275,598,600 as compared with $5,437,922,400 for the corresponding eleven months of 1929.

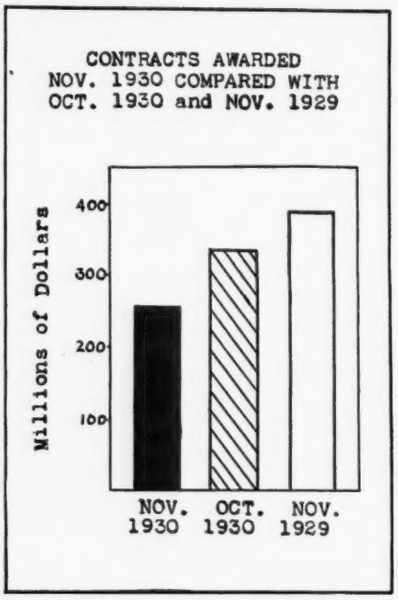
Of the thirteen territories eleven showed declines in November from both the preceding month and November, 1929; the New Orleans territory alone showed gains over both periods; while the Pittsburgh district showed a gain over November, 1929, and a loss from October, 1930.

Awards for construction in New England during November totaled $22,569,200 as against $29,890,000 in October and $24,147,900 in November, 1929. New construction undertaken in the Metropolitan Area of New York totaled $56,702,200 in November as compared with $80,053,300 in October and $150,658,900 in November of last year.

November contracts in Upstate New York totaled $12,556,400 as against $13,479,300 in October and $16,688,500 in November, 1929. In the Middle Atlantic States, contracts awarded during November totaled $24,840,300 as against $32,438,900 in October and $41,363,000 in November a year ago. November awards for construction in the Pittsburgh territory (western Pennsylvania, Ohio, West Virginia, and Kentucky) totaled $39,516,600 as against $48,508,500 in October and $26,751,500 in November, 1929. Southern Michigan reported November contracts at $8,870,200 as against $11,287,100 in October and $16,764,000 in November a year ago.

November contracts in the Chicago territory (northern Illinois, Indiana, Iowa, and southeastern Wisconsin) amounted to $29,746,000 as against $33,409,600 in October and $44,196,300 in November, 1929. The Central Northwest (Minnesota, the Dakotas, northern Michigan, and northwestern Wisconsin) showed November construction awards at $4,851,000 as compared with $5,370,000 in October and $11,166,500 in November of last year. November contracts in the St. Louis district (southern Illinois, eastern Missouri, northeast Arkansas, western Tennessee, and northwest Mississippi) were valued at $11,699,500 as against $29,980,800 in October and $12,889,400 in November, 1929.

November contracts in the Kansas City territory (western Missouri, Kansas, Oklahoma, and Nebraska) totaled $13,988,300 as against $22,147,100 in October and $14,071,800 in November, 1929. Texas showed November contracts at $6,836,600 as compared with $9,392,600 in October and $12,938,200



in November of last year. The New Orleans territory (Louisiana, southwestern Arkansas, and southeastern Mississippi) showed November awards of $9,206,600 as against $6,611,700 in October and $5,388,000 in November, 1929. The Southeastern district (the Carolinas, Georgia, Florida, Alabama and eastern Tennessee) reported November awards of $12,190,800 as against $14,732,500 in October and $13,988,500 in November, 1929.

Building Million-Dollar Plant in Pennsylvania

Bethlehem Mines Corp., of Bethlehem, Pa., a subsidiary of the Bethlehem Steel Corp., is building a $1,000,000 crushed-stone plant near Shainline Crossing, Pa. Buildings under construction include a crushing plant, screening house and washing plant. A machine shop will also be built. All construction is being done by Bethlehem Steel Corp., with William A. Rankin in charge. James C. Ford is to be superintendent of the new quarries. Work is expected to be completed by the middle of 1931.

Iowa Sand Plant Being Moved to New Location

The Concrete Material Corp. has dismantled its sand-and-gravel plant at Clarksville, Ia., and moved to another deposit near Wallingford, Ia. Concrete foundations are being placed for the re-erection of the plant and operations are to be resumed in the spring of 1931, according to James Galyean, manager.

Gypsum Association Urges New Standards

MET IN CHICAGO ON DECEMBER 5

The annual meeting of the Gypsum Assn. was held at the Bismarck Hotel, Chicago, on Tuesday, December 9, with representatives of the following member companies in attendance:

American Gypsum Co., Atlantic Gypsum Products Co., Best Bros. Keene's Cement Co., Certain-teed Products Corp., Grand Rapids Plaster Co., National Gypsum Co., Oakfield Gypsum Products Corp., Structural Gypsum Corp., United States Gypsum Co., Universal Gypsum & Lime Co.

The present officers consisting of James Leenhouts, president; Charles F. Henning, first vice-president; L. I. Neale, second vice-president; and Eugene Holland, treasurer, were re-elected for the ensuing year. Henry J. Schweim was reappointed as secretary.

The Technical Problems Committee appointed a sub-committee consisting of C. K. Roos, of the United States Gypsum Co., W. K. Nelson, of the Universal Gypsum & Lime Co., and J. Miller Porter, of the Structural Gypsum Corp., to prepare a program of problems which necessitate investigative research. This program is to be submitted to the Technical Problems Committee at its spring meeting for approval before being acted upon by the Association.

The proposed revision of the American Society for Testing Materials' Standard Specifications for Gypsum Plaster Board (C37-30) and the Standard Specifications for Gypsum Wall Board (C36-35), as well as Tentative Specifications for Gypsum Sheathing Board (C79-30T), were reviewed by the Technical Problems Committee and suggested changes submitted to the Association for consideration.

In the interest of standardization a discussion was had on the advisability of shipping plaster in one size paper packages. Plaster is now being shipped in 80-lb. and 100-lb. bags. It was the consensus of opinion that plaster be shipped in the 100-lb. packages exclusively. This move not only fits in with the government's recommendations for simplification and standardization in industry, resulting in lower inventory costs to both dealer and manufacturer, but it will tend to cut down over-sanding complaints. In numerous instances the same number of shovels of sand is used to the bag, regardless of whether it is an 80-lb. bag or a 100-lb. bag.

Seattle Producer Gets Highway Material Award

The Pioneer Sand & Gravel Co. of Seattle, Wash., operating six modern plants in the state of Washington, has obtained a contract for 1,000 carloads of material to be used in paving the new West Highway through the state.

N. Y. Operator Builds Crushed-Stone Plant

ORDERS KEEPING NEW FIRM BUSY

Borrman Stone Products Co., Inc., of Norwood, N. Y., is completing the installation of a new crushing plant which will permit an output of 1,800 tons of finished product per day. It was expected that the new plant would be in operation by Dec. 10. Last month the Borrman company began the work of grading preparatory to building a railroad spur track from the Norwood & St. Lawrence R. R. to its plant to take care of rail shipments. The concern will also handle cement and other material used in road building.

In 1928 William F. Borrman and Francis L. Borrman started a small crushed-stone plant on the William F. Borrman farm about two miles north of Norwood, with a daily capacity of about 200 tons of finished product. When their product was put on the market and tested it was found to be of an exceptionally high quality and the demand increased rapidly. Improvements were made to take care of the demand and during this year the plant has been operating night and day to fill orders and early this year plans were made to increase the output to 1,000 tons per day.

In August William F. and Francis L. Borrman took into partnership Oliver and Spellman of Chateaugay, N. Y., and the new company was incorporated as the Borrman Stone Products Co., Inc.

Operates Central Plant to Proportion Material

A simple but efficient central proportioning plant for transit-mixed concrete is operated at Norwalk, Conn., by Bishop & Lynes.

The materials for concrete batches are proportioned by weight dry and the mixing is done in trucks en route. The main aggregate bin has four compartments and a capacity of 200 tons. It is of steel construction and was furnished by the Heltzel Steel Form & Iron Co., of Warren, O. It is equipped with a four-compartment Heltzel Agrabatcher. All weighing is on an automatic, springless, dial scale which, with the Agrabatcher, provides accuracy and speed. Every batch can be back-checked without setting any poises or counterweights.

Cement is purchased in bags which are lifted to the operating platform on a conveyor made by the Portland Machinery Co., of Passaic, N. J. The mixing and delivery of the concrete is by transit-mix trucks that were furnished by the Highway Truck Mixer Co., of Cleveland.

Bishop & Lynes proportioning plant.

Find Huge Deposits of Silica Sand in Nevada

Large deposits of sand suitable for the making of glass have within recent years been found in the state of Nevada. These discoveries are of no small importance especially to Pacific Coast manufacturers who have, in the past, obtained most of this material from Belgium because of a lack of domestic sources of supply within reasonable hauling distance. In Clark County there is a very extensive bed which is now producing. The sand analyzes 98.90 per cent of silica, 0.05 per cent of iron oxide, 0.65 per cent of alumina, and 0.05 per cent of lime. It is suitable for the making of glass of many kinds, and thousands of tons of it have already been used in California factories. What is said to be another high-grade deposit has lately been located in Washoe County.

Virginia Slate Makers Resume Heavy Activity

Three of four slate-producing companies in the Virginia slate field have resumed operations after having been closed since July 1. The Blue Ridge Slate Corp., manufacturers of slate granules used in composition roofing, which has been operating part time all summer, has now begun operations upon a larger scale. The companies now operating, in addition to the Blue Ridge Corp., are the Williams Slate Co., the Arvonia-Buckingham Slate Co., and the LeSueur-Richmond Slate Corp.

The Buckingham slate region is the foremost of its kind in the south, and is one of the most noted in the United States, the slate having been quarried there for considerably more than a hundred years.

California Granite Co. Effects Reorganization

The Eitel Granite Co., Clovis, Cal., has been reorganized as the Academy Granite Co., Ltd. Warren W. Eitel, former secretary of the old company, has joined the sales force of the Superior Granite Co., Inc., also at Clovis. William Anderson has succeeded G. B. Ghilotti as secretary of the Superior company.

Cement Distributing Plant Now Operating

BARGES RUNNING TO MILWAUKEE

The new half-million dollar distribution plant of the Universal Atlas Cement Co. at Milwaukee, Wis., is now in service.

The recently-completed storage plant, with a capacity of 50,000 bbl., began operations Nov. 24. A dozen men are employed.

The first load of cement was delivered to the silos about the middle of November from one of the company's self-unloading barges. The barge brought 188 tons of cement from Buffington, Ind., on its first trip, which, incidentally, was the boat's maiden voyage.

The silos at Milwaukee are equipped for sack or bulk delivery. Two semi-automatic packing machines are capable of filling 60 sacks a minute.

Granted State Charter to Develop Stone Tract

The Jacobs Stone Products Co. of York, Pa., has been granted a state charter to quarry and process stone on a ten-acre tract which the concern owns near York. Capitalization of the new company is $25,000. The deposit is white marble limestone which analyzes 99.57 per cent pure calcium carbonate. Howard E. Jacobs of Thomasville, Pa., is president, while G. Oscar Jacobs and William P. Jacobs, both York residents, are vice-president and secretary-treasurer, respectively. Other directors are Archie Jacobs of Lancaster, Pa., and Mrs. John Brunner of Yorkhaven, Pa.

Quarry in Pennsylvania Adopts Electric Shovel

In the South Temple, Pa., quarry of the Berks Cast Stone Co., a new Thew Lorain 75, 1¼-cu. yd. electric shovel has replaced various older types of equipment for loading broken rock into the trucks at the quarry face. The haul averages about 300 ft. With this shovel it is possible to move 100 tons per hr. in two trucks because of the fast action and the few occasions for shutdowns due to breakage.

Shovel operating in Berks quarry.

Record Road-Building Season in Missouri

STATE SPENDS OVER $30,000,000

More than 7,000 men were employed on state and federal highway projects in Missouri in October and $5,000,000 will be paid out before Jan. 1 for labor and material. The Missouri Highway Commission has announced that 1930 will be a top year in highway construction in this state, with more men employed than in years past.

The building of good roads through Missouri during 1930 will cost the state and Federal governments $30,000,000. Of this amount, $25,000,000 has already been spent. Up to the present time in 1930, 380 miles of concrete slab, most of it 20 feet in width, and 550 miles of gravel highways have been built. This exceeds construction in other years, and completes approximately 68 per cent of the Missouri road building program.

Under present plans, 1,559 miles of primary highways will be completed by 1931, 5,927 miles of secondary highways by 1933, and 6,000 miles of farm-to-market highways by 1937. Missouri began its road construction program in 1923 and since that time has made great steps forward. The slogan to "take Missouri out of the mud" has been generally accepted by voters, and officials state that every highway bond issue has been well supported.

There has been a general effort made by the highway department to complete a system of concrete and gravel highways into the Ozarks as quickly as possible in order that the scenic beauties of that hill country might be seen and appreciated by tourists.

Seeks Change of Rates on Gypsum Commodities

A petition seeking reasonable rules and a change in freight rates covering mixed carloads of plaster and plaster wallboard has been filed with the Interstate Commerce Commission by the Wisconsin Retail Lumbermen's Assn. The present rules provide minimum weights from 40,000 to 60,000 lb. on mixed carloads and from 40,000 to 50,000 lb. on straight carloads. The dealers want a reduction in the minimum weight to enable them to handle straight cars or mix the carloads to get various amounts of gypsum products. It is claimed that the present rules work a hardship on dealers who are unable to handle the large amounts at one time because of lack of storage space.

Chemical Lime Co. Gets New Roster of Officers

At a recent meeting of the board of directors of the Chemical Lime Co., Inc., of Bellefonte, Pa., H. D. Brigstocke, formerly secretary and treasurer of the company, was elected executive vice-president. H. G. Patee was elected secretary and treasurer. Robert S. Walker, who has been associated with the company for 17 years, will continue as production manager.

O. H. Nance was elected president of the company to succeed John L. Burns some time ago. The company will make large capital expenditures this fall improving its properties and erecting storage facilities to care for increasing business.

Major Cement Combines Reported from Germany

According to press cables from Germany, the Portland Cement Works of Heidelberg, Mannheim & Stuttgart, A. G., has completed an agreement with the Silesian Portland Cement Industry, A. G., involving a community of interest between the two concerns through an exchange of 25 per cent of their capital stock. The agreement involves the maintenance of the friendly relations of the two concerns to the Dyckerhoff cement group.

The Silesian Cement Industry, A. G., it was also reported, has completed a further community of interest with the Saxon-Thuringian Portland Cement Works and the Pruessing & Adler German Portland Cement Works, thus evolving a major cement combine along national lines.

Predicts 100,000 Fatal Accidents During Year

One hundred thousand lives will be the accident toll for 1930 in this country unless there is a decided reduction from accidental deaths during the remaining weeks of the year, according to Dr. Louis I. Dublin, statistician of the Metropolitan Life Insurance Company. In addition he predicted that the list of injured will total several million. Dr. Dublin pointed out that accidental deaths have been on the increase, totaling 97,000 in 1929; that at the present time their number exceeds those resulting from tuberculosis and that, among males in the United States, accidents are second in importance to heart disease as a cause of death; while tuberculosis is seventh. He also declared that the United States leads all other countries in its accident death rate, which is about twice that prevailing in England and Wales.

Near Completion of New Cement Plant in Mexico

The new half-million-dollar cement plant of the Cement Portland Nacional, S. A., Governor Francisco S. Elias, president, under construction at Hermosilla, Mexico, is expected to be completed in time to begin production of cement early in January. The new plant is being erected by the Macdonald Engineering Co. of Chicago and Los Angeles.

Three-Millionth Sack of Cement Is Filled

PACIFIC CO. OBSERVES OCCASION

The Pacific Coast Cement Co., of Seattle, Wash., celebrated last month the filling of its three-millionth sack of cement for this year.

The plant, it is reported, has orders enough ahead to keep it running at capacity for the next six months at least, keeping more than 200 men steadily at work.

More than 600,000 sacks have been delivered to the Ariel Dam which is being built in the southwestern part of Washington. Other orders include a number of consignments to Alaska, Idaho and Oregon.

The *Diamond Cement*, one of the company's ships, is now making weekly trips to Dall Island in Alaska, where the lime quarries are located, and cargoes will be delivered at the plant from the north all during the winter.

A miniature celebration was held at the plant when the 3,000,000-sack mark was passed, N. D. Moore, vice president of the company, wheeling the truck load carrying the celebrated sack into a waiting boxcar. He was assisted by W. H. Green, plant superintendent, and Darwin Meisnest, sales manager of the company.

Producers Lease Space in New Office Building

A number of concerns prominent in the production of non-metallic minerals have leased office space in the new building at 1616 Walnut St., Philadelphia. Among the companies locating at that address are the Universal-Atlas Cement Co., the Warner Co., and the Hy-Test Cement Co., Inc.

California Plant Sold; Improvements Under Way

The Service Gravel Co. of West Riverside, Cal., has purchased the plant of the Riverside Gravel Co. and has begun extensive improvements, including a tunnel under a city street adjoining the plant for facilitating handling of material.

Philadelphia Quartz Co. Puts $100,000 in Plant

Plans for an addition to the plant of the Philadelphia Quartz Co. at Philadelphia have been announced. The work will cost about $100,000, it is said.

Acquires Memphis Plant of Loeb Stone Company

The Hydro-Stone Co., of Memphis, Tenn., has acquired the plant of the Loeb Stone Co., also of Memphis.

Texas Cement Plants Undergo Improvement

LONE STAR ADDS TO FACILITIES

The Lone Star Cement Co. Texas is completing an extensive reconstruction program begun last spring at its Dallas plant. In commenting on the building and equipment installations, L. R. Ferguson, vice-president of the company, recently said:

"The construction program undertaken by the company last spring had a twofold object: First, to further improve the manufacturing facilities of the company and keep them abreast of the latest developments and improvements in the manufacture of Portland cement, and, secondly, to provide employment for many of our workmen whom we otherwise would have been forced to lay off and deprive of their income.

"In the face of unfavorable business conditions, the company has made this substantial investment for additions and betterments, in anticipation of a business revival which we confidently expect in the near future.

"This construction program is directly in line with the course advocated by national, state and civic leaders, of providing uninterrupted employment to maintain the purchasing power of the public, which in the last analysis is the real basis of prosperity.

"Thus, even though the demand for cement during the current year has shown a decrease, the company has so far been able to keep practically all of its employees at work.

"The company is now planning similar improvements at its plant at Houston and will, during the coming months, make extensive additions at that property which, in addition to still further modernizing its manufacturing equipment, will provide work for a large number of employees.

"Our construction programs at Dallas and Houston are the answer of our company to the question, 'What is the future outlook for business?' They are a practical demonstration both of our faith in the early return of improved business conditions and in the future prosperity of the nation."

Crushed-Stone Producer Installs New Equipment

The Federal Crushed Stone Corp. of Buffalo, N. Y., is making extensive improvements to its plant at Cheektowaga, N. Y., which was built a little more than a year ago. Several new Niagara vibrating screens and two new Allis-Chalmers Newhouse recrushers will be installed to enlarge the plant's capacity for medium-sized stone for which there is a rapidly increasing demand. A number of Niagara screens will be used also in connection with a new stone-washing system which will be installed at the same time. Provisions were made in the original design of the plant for such an installation and no reconstruction of the plant will be necessary. All improvements will be completed by April, 1931.

Gypsum Association to Have New York Offices

The Gypsum Assn., which was recently organized in Chicago, with offices at 211 West Wacker Drive, announces the opening of a New York office located at 11 West 42nd Street, with J. Kent Smith as district engineer.

Mr. Smith is a graduate of the University of Pennsylvania in both engineering and law and has, for a number of years, been connected with the Eastern Underwriters' Assn. He will coöperate with architects, engineers and building commissioners concerning the use of gypsum and gypsum building products.

Producer of Dune Sand Adds Electric Screens

During the year the Nugent Sand Co., Muskegon, Mich., installed an electric screening plant at its pits to further improve the quality of its product and increase the tonnage produced. This plant represents an outlay of approximately $20,000 and will screen all sand through ⅛-in. mesh before loading and permit a production of 350 tons per hour. As far as is known this company is the only rail shipper of dune sand attempting to screen its product before loading. The sand is used primarily for foundry core purposes.

Gets Canadian Right to Asphalt-Paving Process

Villeray Quarries Co., Ltd., of Montreal, Que., which recently acquired the Canadian right to manufacture a new German asphalt-paving mixture, has started construction of an all-steel plant to prepare the material. Much of the equipment has been purchased abroad, it is reported.

Aggregates Trailers Cut Delivery Costs

PRODUCER ALSO BUILDS ROADS

The problem of delivery cost and time is an important factor entering into the construction of roads. The Scharl Construction Co. of Grand Rapids, Mich., found this to be true recently in the building of fifteen miles of concrete road between Battle Creek and Hastings in Berry County, Mich., on State Road M37. The company also operates the Kent Sand & Gravel Co., the nearest gravel pit of which is at Cascade, about ten miles east of Grand Rapids, a distance of 43 miles from the road job.

By rail, the cost of delivery would be $2.23 per cu. yd., entailing several handlings and delays. So the construction company employs motor trucks to get the gravel to the job at less expense and with an enormous saving of time. Two Federal Big-six, Model 4C6 trucks with hydraulic hoists and 4-cu. yd. dump-bodies are used. Each truck pulls a 4-wheeled 10-ton trailer with three gravity-type, side-dump bodies. Each trailer compartment has a capacity of 2½ cu. yd., thus giving a capacity of 7½ cu. yd. per trailer unit. The entire train is controlled by Westinghouse air brakes.

Each truck and its trailer make two trips per day, hauling 11½ cu. yd. per trip or 23 cu. yd. per day. The distance traveled by each truck is 160 miles, making the average cost of delivery $1.55 per cu. yd., a saving of 68 cents.

The driving time from the gravel pit to the road job is 2 hours. The return trip is made in 1½ hours. About 45 minutes is spent at each end of the run for loading and unloading. The route is over gravel roads and several steep grades are encountered. However, the low speeds of the powerful Federal 7-speed transmission are fully capable of carrying the trucks over these hills without trouble.

Truck and trailer of the Kent Sand & Gravel Co.

Efficient Design Enables Four Workmen to Handle Entire Production

Incline used to launch the new dredge.

The dredge in operation. Note hydraulic stream.

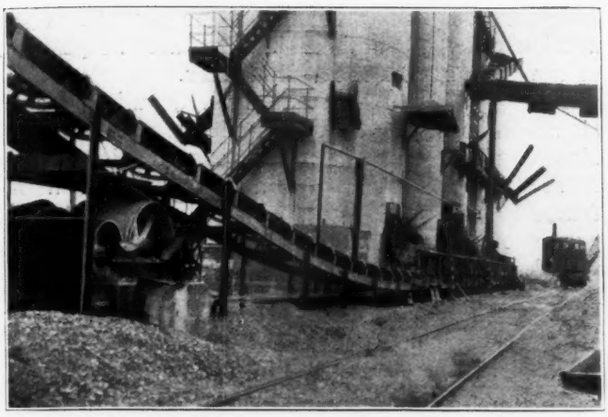
Experience of Pioneer in Industry Is Reflected in Lay-out of Southern Indiana Sand-and-Gravel Operation

THIRTY-FIVE years of experience in the sand-and-gravel industry is reflected in the design and construction of one of Indiana's largest and finest aggregate plants located at Terre Haute.

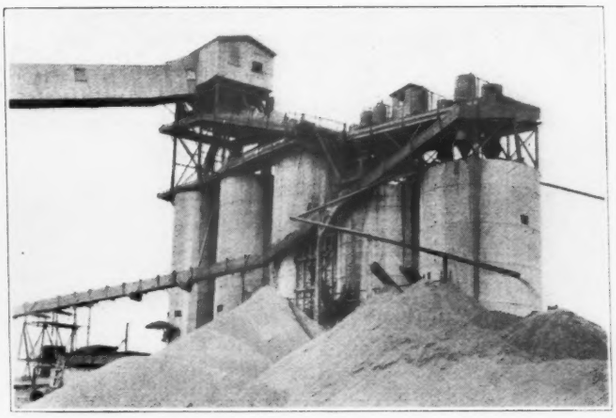
George J. Nattkemper, its president, founded this institution, the Terre Haute Gravel Co., during the time that he was connected with the Chicago and Eastern Illinois R. R. as traveling freight agent. During the first two years of operation, the material was loaded with a wheel-barrow. Foreseeing the growing demand for gravel and sand and the necessity of a larger capacity, Mr. Nattkemper formed a partnership with J. R. Connelly and a small portable plant was erected, forming the nucleus of the present large organization, which is capable of shipping seventy-five car-loads of aggregate per day. Mr. Connelly was Mr. Nattkemper's associate in this line of business until his death, four months ago. His son, Charles F. Connelly, has succeeded him in the business.

The new plant, aggregating an investment of more than $300,000, with 150 acres of land, takes the place of two former plants, one at Summit Grove, the other at West Terre Haute, Ind.

Panoramic photograph showing the complete lay-out of operations at the



Belt conveyor for loading cars. Note drive at left.



Concrete silo-type loading bins and open storage.

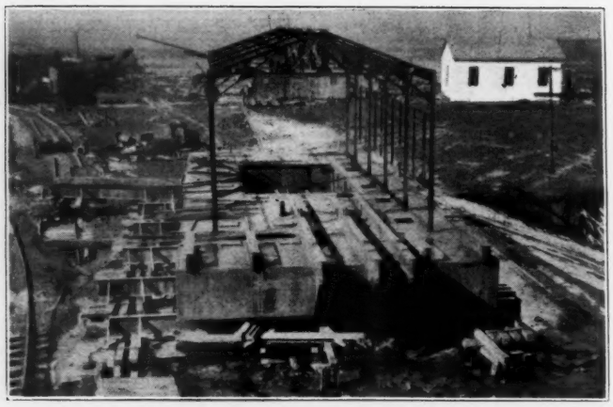
The company's location has an unusual advantage for railroad transportation. It is situated directly on the Pennsylvania and Big Four Railroads and within 600 ft. of the C. & E. I. Railroad, and is within three miles of the center of Terre Haute. This unusual advantage of location is a convenience to the railroads, enabling them to secure ballast material, and an excellent source of revenue for the company.

Essentially, the new plant consists of a dredge equipped with an Amsco 15-in. pump, a primary washing plant which includes the scalping screens and crushers, the final washing plant and sand-settling tanks, and the concrete storage bins. In addition, a second dredge is used to remove waste sand with the assistance of a booster pump.

Incorporated in this arrangement are many features of interest, probably the most important of which is the fact that only four men are required to manipulate the entire production equipment from the dredge to the bins. One man handles the entire dredge machinery. This practice is exceptional, considering the size of this equipment. Another feature is the system of loading cars. Two men can readily handle this phase of the work. A belt conveyor with access to the lower bin dumping gates—thereby taking advantage of the full capacity of each concrete bin—transports the material to a loading platform where it again receives a deluge of washing water before it enters the spreader hopper. A spreader of special design loads the material in a lateral travel, filling each car uniformly without the aid of hand scooping and eliminating the segregation of materials.

The construction of the plant is worthy of attention in that it is entirely fire-proof. Steel and concrete were used exclusively from the dredge to the bins, eliminating the usual maintenance and re-

plant of the Terre Haute Gravel Co. at Terre Haute, Ind.



Construction view of dredge, an all-steel affair.

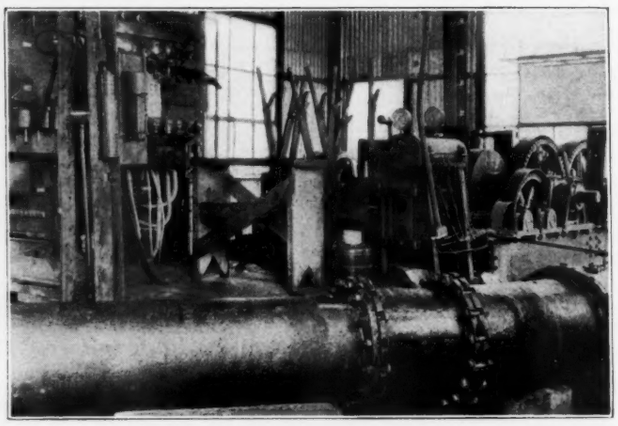
pair of timber construction. Credit for the design is due to the company and the engineering staff of the Link-Belt Co., who drew the plans.

A dredge, built entirely of steel, is used to excavate the gravel. It is 26 ft. wide by 60 ft. long and has a hull consisting of 21 steel chambers riveted together. Each seam below deck level is also electric welded. The pontoons were built by the Hetherington & Berner Co. of Indianapolis, Ind. Steel framing with galvanized, corrugated, sheet iron is used in the dredge-house walls and roof. A Moore 5-ton differential hoist, traveling on an I beam supported by the roof trusses, has access to all the heavy machinery aboard. The mechanical equipment of the dredge centers about the 15-in. Amsco dredge pump with its 350-hp. Allis-Chalmers 550-r.p.m., 2,200-volt induction motor. To lower the center-line of the pump, it was placed in a 4-ft. sump built in the hull, thereby bringing the suction pipe to the floor level, eliminating one elbow. An Eagle Swintek screen-nozzle ladder permits a cutting depth of 60 ft. It is guided by a heavy A-frame bridge work on pontoons which are hinged to the dredge hull and is connected to the pump suction pipe with Goodyear reinforced suction hose and Knox clamps. The Swintek ladder is powered by a 25-hp. motor with a gear reduction.

A Thomas 3-drum hoist, driven by a General Electric 22-hp. motor, controls the position of the suction pipe. Two drums manipulate the position of the dredge from the anchor lines.

The bank of gravel requires a hydraulic-pressure stream to loosen and avalanche it. Accordingly, an Eastman 1-in. monitor nozzle, controlled by wires from the operator's platform, is mounted on the A-frame bridge. It is supplied with water at 100-lb. pressure from a Weinman Pump Mfg. Co.'s 3-stage, 4-in. by 4-in. centrifugal pump driven by a General Electric 75-hp. motor.

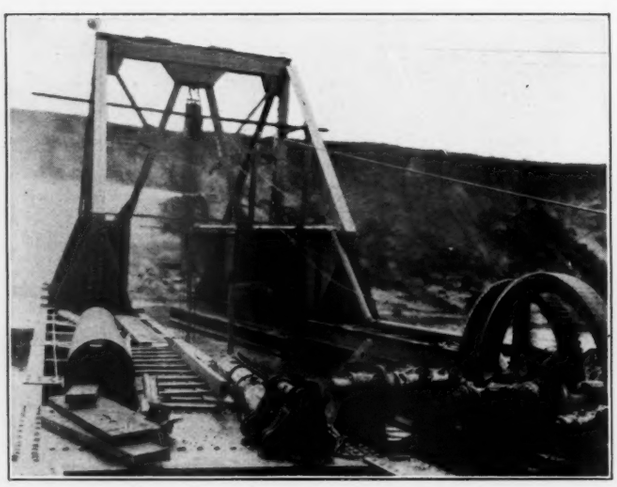
A Goulds 2-in. end-suction, centrifugal pump, driven by a 5-hp. motor, is employed to prime the Amsco pump. Two small hand-operated winches control the back anchor lines of the dredge.



The control platform. Suction pipe-line in foreground.

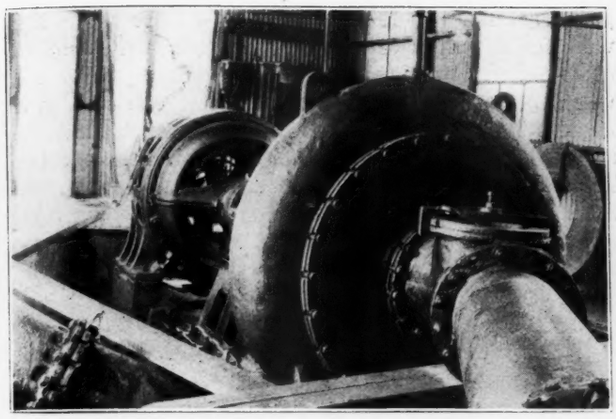
Controls of all the dredge machinery are located on a raised platform, within easy reach of the operator. One man sitting in a comfortable position has access to every control normally required. The Amsco pump-motor switchboard is mounted to the left while the hoist controls and the monitor nozzle are in front.

At the present time, the dredge is operating 200 ft. from the discharge box, with its pipe line carried on pontoon rafts each having 12 oil drums. An Amsco swing check valve near the discharge end

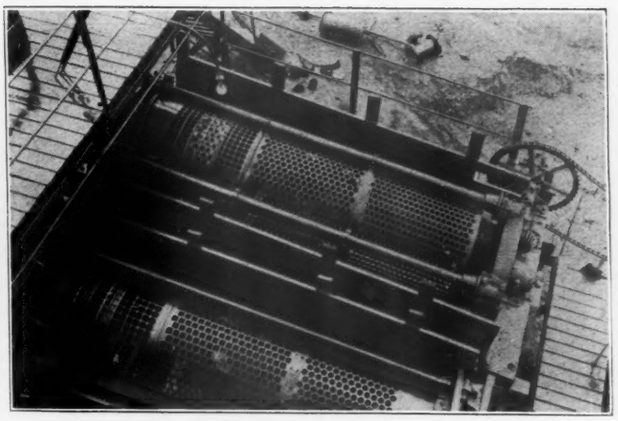


Monitor nozzle in action on board dredge.

Pump house at well. Beams support suspended pump platform.



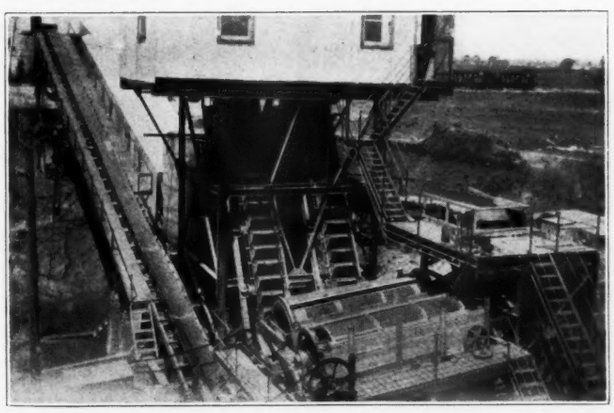
The 15-inch dredge pump and motor drive.



The two scalping screens as viewed from above.

of the pump prevents reversal of the sludge flow.

The sludge enters the plant through an 8-ft.- wide by 12-ft.- long by 5-ft.- deep baffle box which checks the velocity of discharge and divides the material to two scalping screens. Each scalping screen is 12 ft. long and 4 ft. in diameter, and is equipped with three sections of screen. The first unit is a Worthington, having two sections of 1¾-in. square perforations and one section of 2-in. round perforations. The second unit, an Allis-Chalmers, has a section of 2-in. perforations, another has 1¾-in. square perforations, and a third has 2-in. round perforations. Both screen units are driven from a common shaft powered by a 20-hp. motor through a chain drive. All rejected material from the two scalping screens is loaded on a 24-in. belt conveyor to the crusher surge bin. This conveyor is 153 ft. long on centers and operates at a speed of 200 ft. per min. driven by a 10-hp. motor. It is Link-Belt equipped throughout, including the silent-chain drive.



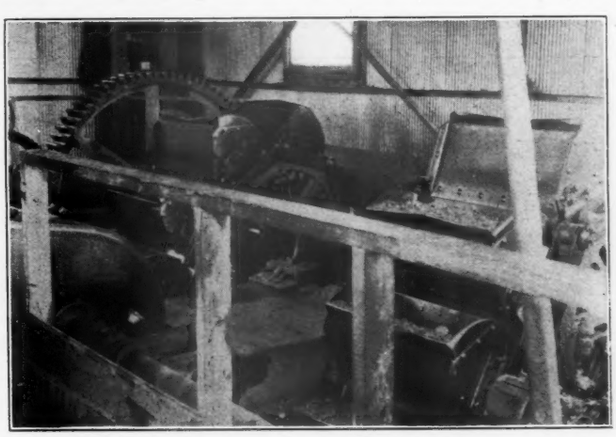
Twin elevators with dewatering buckets. Control house overhead.

Two crushers, placed side by side, receive the oversize rock in common from a surge bin overhead. This bin is 12 ft. square and has a self-cleaning bottom. Two slide-gates control the flow of materials to the crushers. The two crushers, each belt-driven from a 25-hp. motor, are McCully type No. 4, one built by the Worthington Pump & Machinery Co., the other by the Allis-Chalmers Co. This type of crusher is now manufactured exclusively by the latter company. They are set at 2 in. and discharge to a 24-in. belt conveyor, 150 ft. long, which returns the material to the scalping screen hopper. The return conveyor operates at 200 ft. per min., is Link-Belt equipped, and is driven by an Allis-Chalmers 5-hp. motor.

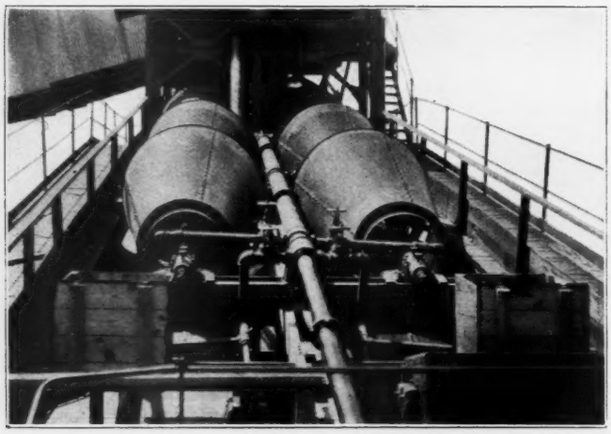
Throughs from the scalping screen fall into a concrete sump where they receive a preliminary washing by the action of the two Link-Belt dewatering bucket elevators.

The sump is 40 ft. long, 16 ft. wide and 8 ft. deep, with a center wall, creating two 8-ft. tanks each equipped with a Link-Belt dewatering bucket elevator arranged to scrape the material from the bottom of the sump in a short horizontal travel and then to elevate it to the plant-conveyor surge bin. Each elevator has sixty 30-in. by 12-in. by 18-in. perforated buckets forming a total chain length of 90 ft. The center distance is 35 ft. 6 in. Both elevators are driven from one motor through jack-shafts, each equipped with hand-operated lever clutches. An Allis-Chalmers 50-hp. motor with a Link-Belt silent-chain drive powers the two elevators. A steel-frame corrugated-iron building houses the motor control apparatus and the head shafts of the elevator.

The two elevators discharge into an 80-cu. yd. circular concrete bin, 16 ft. in diameter and 12 ft. high, which acts as a surge bin for the plant con-



Close-up view showing discharge of dewatering elevators.



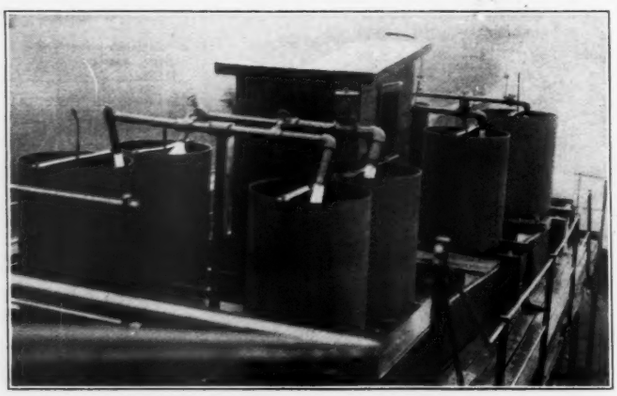
Lines of conical-screens used for washing and sizing.

veyor. In the event of momentary difficulty on the dredge or in the screening plant, this surge bin insures a continuity of operation.

A company-designed roll feeder consisting of a 30-in. by 30-in. pulley feeds the plant conveyor uniformly. It is driven from the tail shaft of the conveyor, receiving the material from the bin slightly back of its vertical center line, carrying it over and dropping it to the belt below. A hand-operated gate adjusts the rate of flow to the feeder.

The main plant conveyor is a 30-in. belt on Link-Belt, Timken-bearing idlers having an understructure of steel completely inclosed by a corrugated-iron housing. It is 374 ft. long on center distances, elevating the material through an angle of about 14 deg. to the washing and classifying screens above the loading bins. The speed of the conveyor has been increased to 500 ft. per min. to prevent the rather wet material from flowing backward. It is driven by a 75-hp. General Electric motor through a Link-Belt silent-chain drive. Alemite fittings are installed on each idler bearing.

After the material leaves the head pulley of the plant conveyor, it is divided and chuted to the two units of the Link-Belt Dull conical washing and classifying screens. Four conical screens make up each unit, and the two units are driven by a 20-hp. motor through a Link-Belt chain drive. One screen unit has four cones with perforations as follows: 1⅝-in., 1-in., ½-in., and 5/16-in. perforated screens. The other unit has 1⅝-in., 1¼-in., ⅝-in., and 5/16-in.

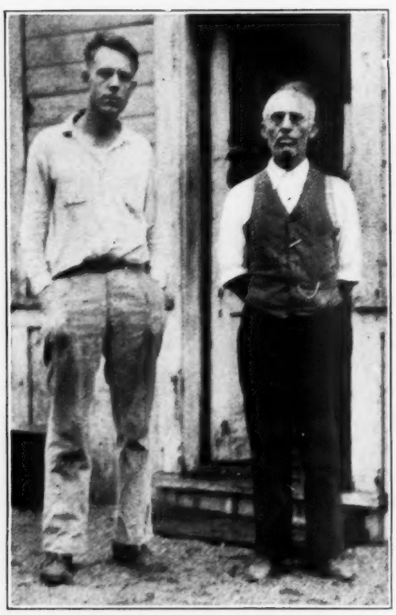


Water-supply tanks above sand classifiers.

perforations. A 12-in. pipe line direct from the well feeds water to a header between the screen units, each cone receiving a branch pipe for its washing jet. At the foot of each screen unit is a Link-Belt 3-ft. by 5-ft. vibrating screen, one having a ¼-in. mesh screen, the other a 9/16-in. mesh screen. They are powered by 3-hp. motors, and assist in the final washing process of the smaller-size gravels. All materials from the screens are spouted to bins beneath.

To reduce the wear on the concrete walls of the bins the spouts discharge into a welded steel box with a circular opening in its bottom. The downcoming material strikes the gravel in the box, checking the velocity of fall, thereby eliminating the tendency to strike the steel work above the bin and the concrete walls.

Eight Shaw classifiers, mounted on a steel framework in pairs, handle the sand-classifying duty. Four 24-in. units are used for coarse sand, two 30-in. units for a medium grade, and two 36-in. units for masons' sand. First in the line of the sand flume are the four coarse-sand units producing concrete sand, which is chuted to the sand bin beneath. The latter is partitioned into halves, one-half for the sand mentioned, the other half for 20-mesh - screen sand.

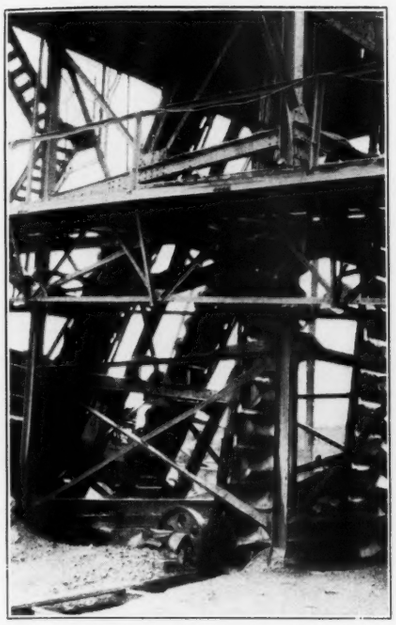


Rudolph Nattkemper, plant superintendent, at left, with plant foreman.

The two 30-in. Shaw classifiers can produce either coarse sand or masons' sand as required, and the two 36-in. units last in line are set to produce fine sand only. Waste water and fine sands are then flumed to the old dredge pond.

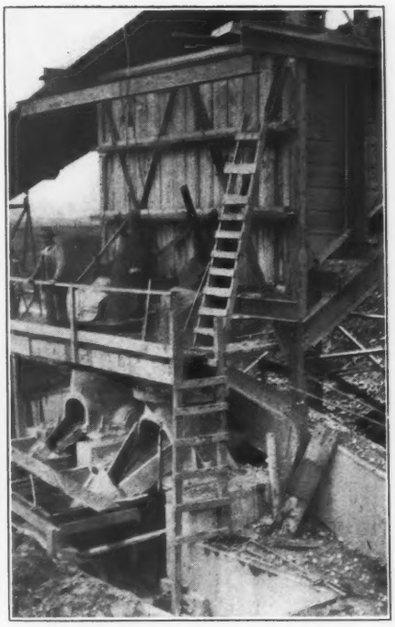
A third Link-Belt 3-ft. by 5-ft. vibrating screen, receiving material from the coarse-sand classifiers, is equipped with a ⅛-in. wire screen to produce a fine grade of dustless bird's-eye gravel used extensively for roofing.

One of the real features of the plant is the excellent installation of loading bins and the efficient means for loading cars. Five concrete silo-type bins were built, three of which are 50 ft. high and two 40 ft. high, all being 20 ft. in diameter. Their combined capacity is estimated at 35 cars. Cars can be loaded from either side of the bins as required. In addition, a belt-conveyor system is used for loading proportioned aggregates or ballast. Each bin gate discharging to the conveyor can be set for any quan-



Dewatering elevator in operation.

Locomotive clam-shell crane.



Crushers beneath surge bin.

tity of flow desired. This system has the advantage of utilizing the full capacity of each bin. The conveyor has a combined horizontal and inclined travel of 209 ft. It is a Cincinnati Rubber Mfg. Co. 30-in. belt, driven by an Allis-Chalmers 50-hp. motor. It travels at a speed of 400 ft. per min., discharging into a steel bin which is equipped with a specially-designed spreader. The material, upon leaving the conveyor, passes over a 3-ft. by 12-ft. screen, with ⅛-in. mesh, to the spreader hopper. A wash of over 1,500 gal. of water per min. insures the complete removal of clay slime. The spreader has a travel of 3 ft. on a small track, receiving power from the conveyor head shaft. It insures a uniformly loaded car, preventing segregation of materials.

For handling cars, the company has nearly 5,000 ft. of sidetracks in four sections. Two Davenport locomotives, one a 20-ton, another a 15-ton, and a 20-ton Vulcan, handle the switching. In addition, a Browning 1-cu. yd. locomotive crane handles stockpile materials and loading of cars.

The car-loading system in use allows a car to be loaded in 6 minutes. This rate of more than 71 cars per day illustrates its size and efficiency.

Like practically all deposits along the Wabash River, there is an excess of sand which must be wasted and, until such time as sufficient area can be opened up so that the waste sand will not have an opportunity to drift against the gravel bank, a sand pump has been installed to deposit this waste sand in an old abandoned pit, formerly operated by the Big Four Railroad, a distance of 2,800 feet.

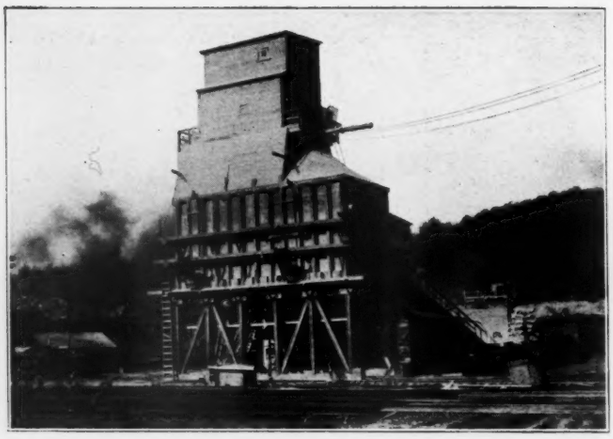
The waste sand and water are discharged into one corner of the pond, where a sand dredge equipped with a 10-in. pump driven by a 200-hp. Allis-Chalmers motor removes the sand sludge, and pumps it to a booster located 1,400 ft. distant. The dredge is of timber construction, mounted on 154 steel oil-drums, each having a buoyancy of 80 lb. The open-end suction pipe is guided by an A-frame and controlled from a single-drum Domestic Engineering & Pump Co. hoist. The latter is driven by a 3-hp. motor through a belt drive.

The booster pump is a Hetherington & Berner 10-in. unit, belt-driven by a 250-hp. motor. It is in a wooden-frame house for weather protection. One man attends its operation. This operation will probably continue for another year, at which time all of the waste sand will be deposited in the pit where gravel is being taken out.

Another interesting feature of the plant is its means of supplying water for washing purposes. Not content with using water from the dredge pond, the company built an open well with a concrete wall of size similar to the loading bins. It is 20 ft. in diameter and 40 ft. deep, with an open bell bottom. Below the natural water table, 1,800 pipe nipples, 1-in. in diameter, were inserted into the circular wall permitting the water to seep in.

A Dean-Hill 10-in. centrifugal pump, having a capacity of 2,500 gal. per min. and driven by a General Electric 125-hp. motor, is suspended in the well, within 8 ft. of the normal water level, on a platform held by steel anchored to two I beams spanning the top of the well. This pump supplies all the water. In the event of a rise in the level of the water, the entire platform with the pump and the suction pipe can conveniently be raised to a safe position. Likewise the platform can be lowered in the event of a drought.

The company maintains an office in the Terre Haute Trust Bldg. Officers of the company include Geo. J. Nattkemper, president; W. F. Nattkemper, vice-president; and Chas. F. Connelly, secretary-treasurer. Rudolph Nattkemper is general superintendent.



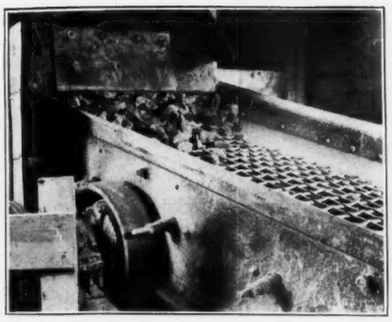
The plant viewed from across the railroad tracks. The quarry is in the left background.

Looking toward plant from quarry. Truck discharging to crusher at the left.

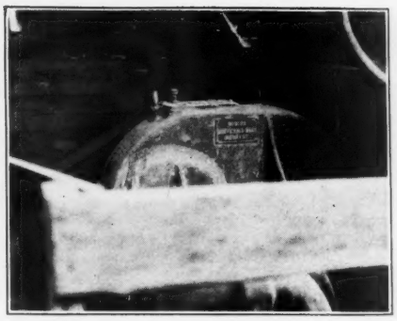
General view of the F. H. Clement plant, showing storage and loading facilities.

Workman sharpening drill steel in the blacksmith shop.

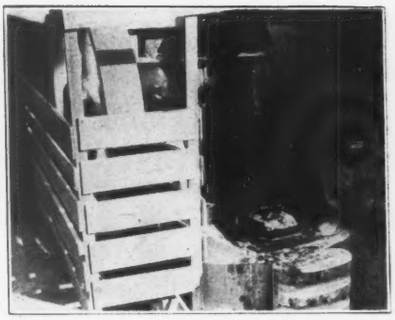
Crawler-mounted steam shovel loading truck in quarry.



Double-deck vibrating screen.



Speed reducer on elevator drive.



The primary jaw crusher.

Erects Crushed-Stone Plant to Furnish Ballast on 3-Year Contract

Hardness of Trap-Rock Deposit Keeps Two Men Busy Sharpening Drill Steel

THE most recent development in the crushed-stone industry in northeastern New York State is the new plant of F. H. Clement & Co. at Comstock, which went into operation late in the summer. The plant was erected to fill a contract with the Delaware and Hudson Co. for railway ballast. This contract calls for a total of 400,000 tons of rock to be furnished during the next three years.

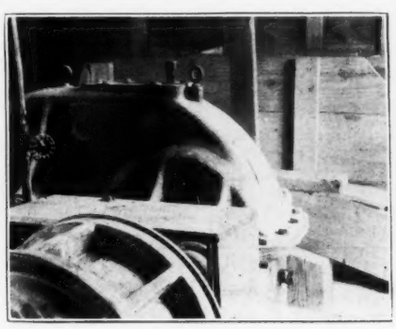
The deposit is owned by the railroad and consists of an extremely hard trap-rock in a somewhat irregular and broken formation. What little stripping of overburden is necessary is done with an Erie 1-cu. yd. steam shovel which is used also for loading stone in the quarry.

The face, at present, averages about 40 ft. in height. Drilling is done by two Loomis Clipper well drills and blasts of from three to five single-row bank shots are made. Dupont 60-per cent gelatin and Cordeau-Bickford safety fuse are used. Secondary drilling is done with Ingersoll-Rand Jackhamers.

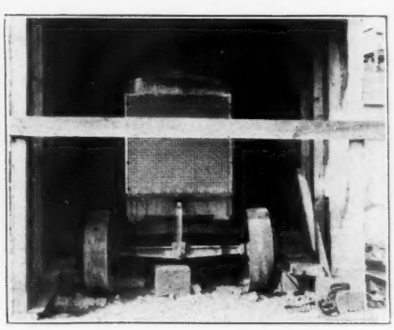
A Marion Type 37 crawler steam shovel with a 1¾-cu. yd. dipper loads the stone into three Mack 6½-ton trucks, which haul it to the plant. The trucks dump their loads into a steel hopper on concrete foundations. This hopper feeds the stone directly into the Traylor Bulldog 42-in. by 48-in. jaw primary crusher. Because of the size of this crusher, no grizzly is used over the hopper. The crusher is driven, through a Texrope 13-strand drive, by a 150-hp. motor. The crusher motor and drive are housed in a neat wooden-frame building.

The crusher discharges the stone onto a 30-in. inclined belt conveyor on 106-ft. centers extending to the scalping building. There the stone is discharged onto an inclined rail grizzly with 2½-in. spacing. The oversize drops through a split chute to two Traylor Bulldog 14-in. gyratory crushers which are set at 2½ in. The material passing through the grizzly and that from the two gyratories go to the boot of a belt-bucket elevator on 63-ft. centers which carries the material to the top of the screening building.

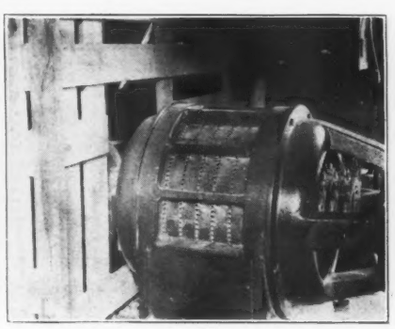
The elevator discharges to a steel hopper which feeds a Robins Gyrex 4-ft. by 8-ft. double-deck vibrating screen. This has 2¾-in.-mesh wire cloth on the top deck and W. S. Tyler ¾-in. Tyloy screen cloth on the bottom deck. The material retained on the top deck drops through a chute back to the gyratory crushers, while the two other sizes go directly to two compartments in the 100-cu. yd.-capacity timber bins that support the screening plant. These bins discharge through bottom- and



Speed reducer on conveyor drive.



One of the portable air compressors.



Motor which drives primary crusher.

Drilling with jackhammers in the quarry.

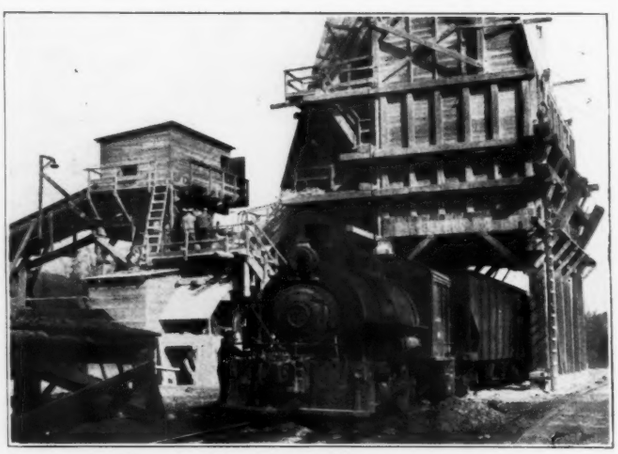
One of the well drills on quarry ledge.

side-discharge gates into cars on a double-track siding.

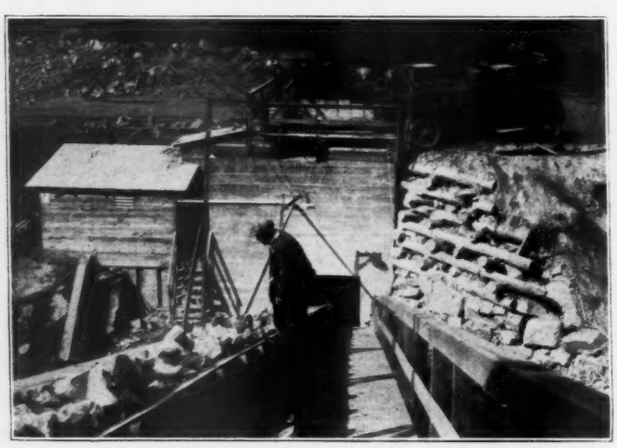
The two Traylor gyratory crushers are driven through Texrope drives by 75-hp. motors. The conveyor and elevator are both driven, through Falk herringbone speed reducers, by 15-hp. and 20-hp. motors, respectively. The vibrating screen is driven, through a Texrope drive, by a 5-hp. motor. The Robins Conveying Belt Co. furnished the conveyor, the bucket elevator and the Durabelt conveyor belting which is used. All motors and electrical equipment are General Electric. Appleton Electric Co. conduit is used throughout.

Due to the extremely hard and abrasive rock in this deposit, two men are kept busy most of the time in sharpening the drill steel. The blacksmith shop houses a Champion forge and an Ingersoll-Rand pneumatic drill sharpener, which are used for this purpose. Air for the drill sharpener is furnished by an Ingersoll-Rand portable, 10-in. by 8-in. gasoline-driven compressor in a small nearby building. An Ingersoll-Rand 5½-in. by 8-in. portable gasoline-driven compressor in the quarry furnishes air for the Jackhamers. Each of these compressors has an air-storage tank and both are inter-connected so that neither operation would have to be entirely shut down in case of the failure of one of the compressors.

Because of the short time the plant has been operating and the speed with which the railroad has been carrying out its improvement program it has been impossible to build up very large stockpiles. As the season progresses, however, these will be built up so that a large quantity of sized stone will be available when the ballasting operations are resumed in the spring. All cars are spotted for loading and stockpiling by a Vulcan 30-ton steam locomotive. All rehandling of material is done by a Brownhoist 15-ton steam locomotive crane. Williamsport cable is used on the crane and shovels.



Plant locomotive spotting cars under bins.

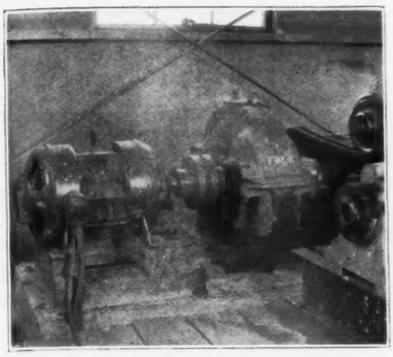


Looking down main conveyor to primary crusher.

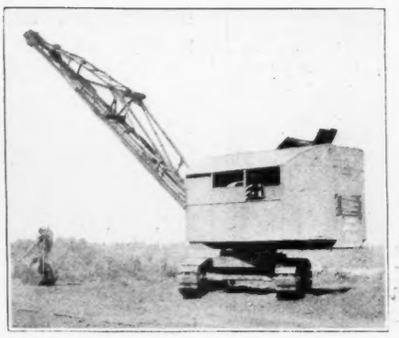
F. H. Clement & Co., owners of the plant, are engineers and general contractors, with offices in the Wilbur Trust Bldg., Bethlehem, Pa. Mike Skertic is plant superintendent and G. H. Gibson is office manager at Comstock.

Efficient Lubricant Has Definite Functions to Perform

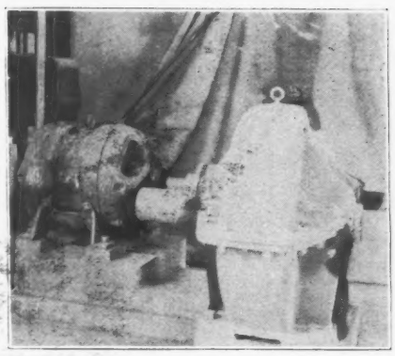
An efficient lubricant really must do three things in a bearing: first, eliminate solid friction entirely by supplying a tough oil film which will separate the metal surfaces; second, substitute for the solid friction the minimum amount of fluid friction; third, stay on the job and lubricate the surfaces with the smallest possible oil consumption.



Motor and speed reducer on agitator.



Crawler crane used for handling coal.



Motor and reducer on slurry elevators.

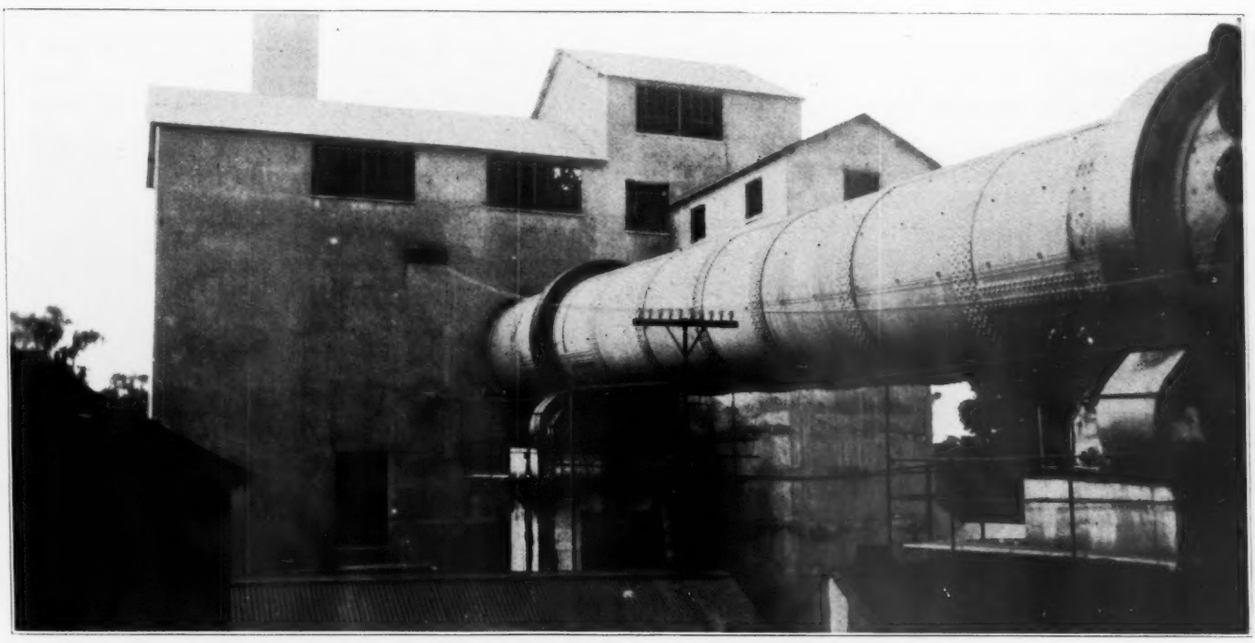
Seven 120-Foot Cement Kilns Replaced by One 305 Feet in Length

Pioneer Plant in Midwest One of Few Still Utilizing Marl as Raw Material

ONE of the few remaining cement plants in the United States which uses marl as a raw material is that operated by the Wolverine Portland Cement Co. at Quincy, Mich. Incidentally, this is one of the pioneer cement plants in the Midwest, it having first gone into operation in 1899.

Since then, however, so many changes have been made that there is no resemblance between the present plant and the original one. In 1899 there were fourteen 6-ft. by 60-ft. kilns. These were replaced in 1910 by seven 6-ft. by 120-ft. kilns. These, in turn, were replaced by the present 10-ft. by 305-ft. kiln which went into operation in the spring of 1930. Another important change occurred in 1927 when the mill's power-generating plant was abandoned and purchased power was adopted. Radical changes were made also in other departments of the plant, from time to time, to keep up with those mentioned. The present capacity of the plant is 1,500 bbl. per day.

The marl deposits from which the mill is supplied lie in the bed of a chain of lakes near the plant. A dredge, equipped with a 1½-cu.yd. clamshell bucket, excavates the marl and loads it into a preparation boat alongside. This rejects the stones and any other refuse, and pumps the marl into 100-ton-capacity wooden barges. These barges are towed from the lakes and through a barge canal to an unloading dock at the plant. Due to the formation of ice on the lakes, it is necessary to shut down the



A view of part of the 305-ft. kiln with feeder building in background.

Unloading marl from the barge.

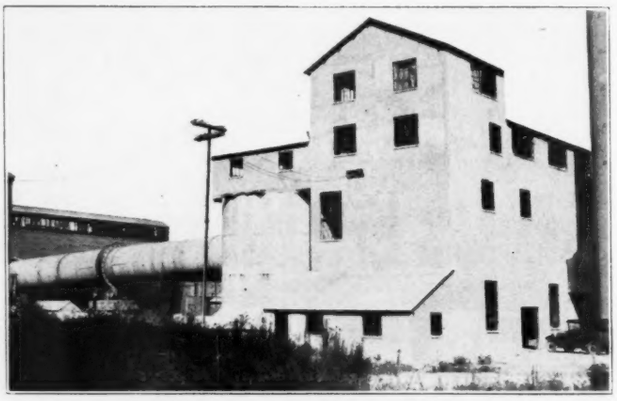
plant for about three months during each winter.

The marl is pumped from the barges, by a return-air system, into six steel storage tanks each of 90-cu. yd. capacity. After each tank is filled, a sample is brought to the laboratory for analysis to determine the amount of clay to be added. Then such required amount of clay is added to the marl as it flows from the tank to the pug mill. The clay is shipped from the company's plant at Coldwater and is put through dry pans before being added to the marl.

The proportioning by this method is so accurate and the analyses of the mixed clay and marl prove so uniform that no correction of the mixture is necessary. The pug mill discharges to a concrete vat from which the mixture goes to tube-mills. The slurry then goes to another vat from which it is pumped to fourteen steel storage tanks of 90-cu. yd. capacity each. These tanks are in the kiln building.

A long screw conveyor carries the slurry from these tanks to the new concrete kiln-feed building. A 50-ft. concrete, inclosed bucket elevator then discharges into the concrete kiln-feed tank which is 24 ft. in diameter by 30 ft. high. This is equipped with a Manitowoc Minogue mechanical-and-air agitator which is chain-driven from a Falk herringbone speed reducer by a 7½-hp. Westinghouse motor. The slurry from the tank is again elevated to the kiln feeder by a second 50-ft. concrete inclosed bucket elevator alongside the first. These are interconnected so that, if desired, the slurry can be fed directly from the mill stream to the feeder. The elevators were furnished by the Link-Belt Co. and are driven, through individual clutches, by a 25-hp. Westinghouse motor and a Falk speed reducer.

The ferris-wheel slurry feeder is of the company's own design and feeds more than 1,000 lb. of slurry per minute into the kiln. The slurry is fed from the elevator by a short screw conveyor. Another conveyor takes the overflow from the feeder back into the agitator tank. The feeder was made by the

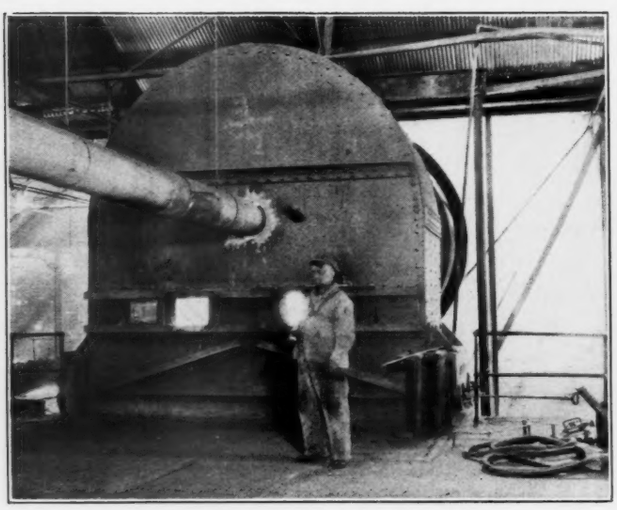


Kiln and feeder building. Feed tanks in center.

Anchor Steel & Eng. Co. and is driven by a counterbalanced rope-drive from a sheave around the kiln. The two short screw conveyors are driven from the same 25-hp. motor and Falk speed reducer through chain-and-gear drive.

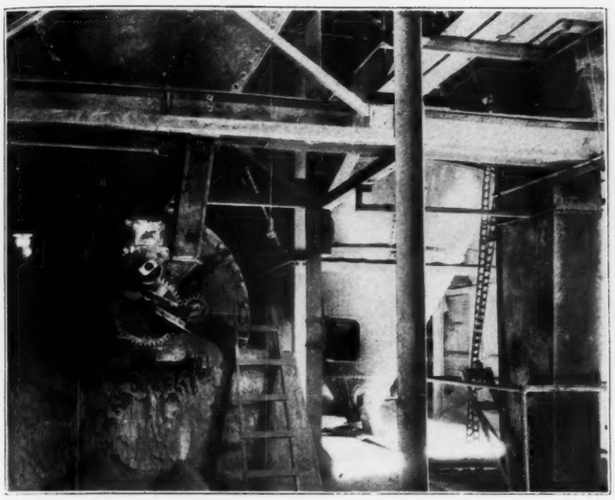
The Allis-Chalmers kiln is 305 ft. long by 10 ft. in diameter and is fitted with an F. L. Smidth chain system. It is driven by a 100-hp. variable-speed motor which gives it the relatively high speed of one revolution in 58 seconds.

A Buffalo 10-ft. fan, driven through a Link-Belt

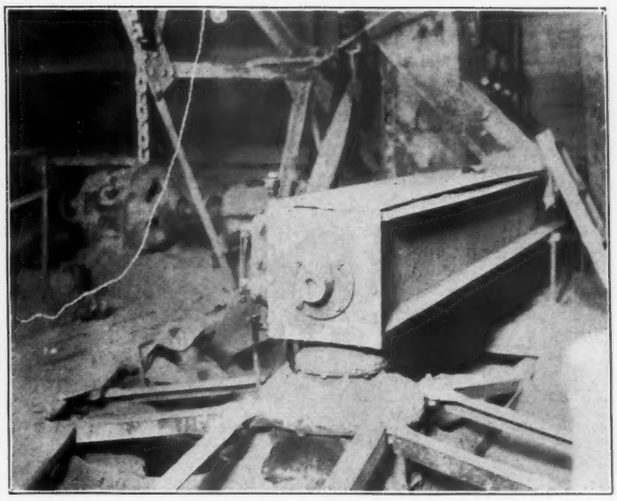


Coal-feed pipe entering hood of the kiln.

Mechanical-and-air agitator above kiln-feed tank.



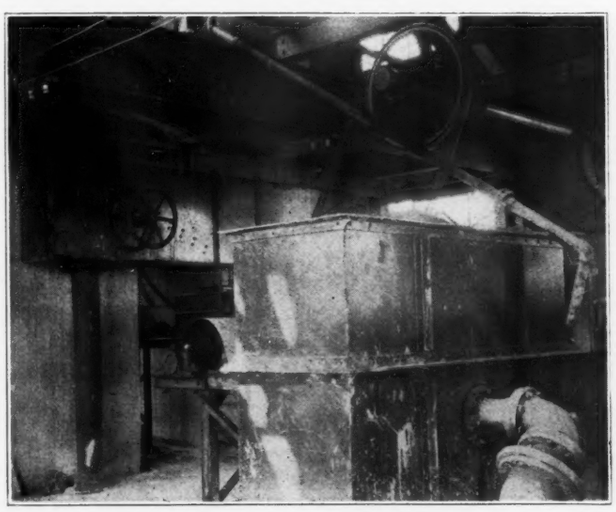
The 14-ft. air separator (right); tube mills at left.



Feed and drive at top of the air separator.

silent-chain drive by a 75-hp. Westinghouse motor, handles the exhaust gases from the kiln into the kiln stack. This stack is 100 ft. high and 10 ft. in diameter at the top and, together with the two concrete elevator casings and the slurry storage tank, was built by the Rust Engineering Co. The kiln-feed hood is fitted with an Allis-Chalmers seal-ring.

Coal for kiln firing is unloaded from cars to storage by a P & H No. 206 gasoline crawler crane equipped with a 7/8-cu. yd. Williams clamshell



The Ferris-wheel slurry feeder.

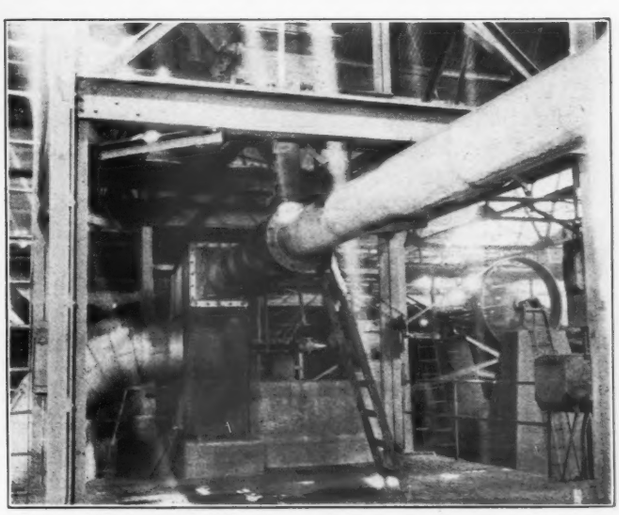
bucket. This feeds to a Turney dryer and to four Griffin mills for pulverizing. A 6-in. Fuller-Kinyon pump feeds the pulverized coal to a 28-ton-capacity steel bin above the kiln-burning floor. Pulverized coal is fed into the air stream to the kiln by a Bailey feeder connected to a Reeves variable-speed drive. A 4-ft. Sturtevant fan furnishes the air stream.

The controls for kiln speed, exhaust damper, fan motor, coal feeder, and primary air are conveniently located on the burning floor. There is also an electrical recording pyrometer which registers the temperature of the kiln exhaust gases and electrical recording gauges which indicate the draft in the exhaust housing. These instruments also are located on the control panel.

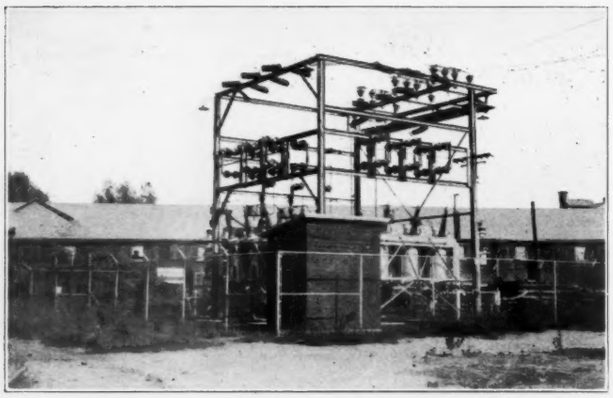
The clinker drops from the kiln into a pit from which it is recovered by either of two drag-chain conveyors. These feed either to an old pan conveyor which handled the output of the old kilns or into a cooler which was constructed by adding to one of the old kilns. Both of these discharge into storage.

The clinker is taken from storage by a Sprague monorail hoist equipped with a 1-cu. yd. clamshell bucket. This discharges to a scale where gypsum is added. An elevator then handles the material to tanks which feed nine 30-in. Griffin mills. Final grinding is done by two 5-ft. 6-in. by 22-ft. Allis-Chalmers tube-mills. The cement goes to a 14-ft. Gayco air separator from which the coarse fraction of the cement returns to the tube-mills. The finished cement is carried by screw conveyors and elevators to a bin storage from which it is drawn in the same manner and packed by Bates packers.

With the exception of the concrete slurry-feed tank, elevators and the kiln stack, all of the construction and machinery erection involved by the addition of the new kiln was done by the company's



The coal-feed fan with feeder above.



Outdoor substation at the Quincy, Mich., plant.

own forces. This includes the driving of piling for the stack and kiln foundations, the kiln erection and the pouring of building, elevator, tank and stack foundations. The steel framework of the feeder building, the kiln-dust housing and the dust flues were fabricated and erected by the Elkhart Bridge Co.

The Wolverine Portland Cement Co. operates another plant at Coldwater, Mich., which has a capacity of 1,600 bbl. per day. This was erected one year before the plant at Quincy. Both are located on the Toledo-to-Chicago branch of the New York Central.

The main office of the company is at 30 W. Chicago St., Coldwater, Mich. Officers are: C. C. Jones, president and general manager; A. E. Robinson, vice-president; P. H. Sweeney, secretary and treasurer, and W. F. Murray, general superintendent.

Abolish 10-Cent Price Differential to Portland-Cement Dealers

A number of cement companies have announced new marketing plans which eliminate the old 10-cent-per-barrel discount to dealers and replace it with a service payment of 5 cents per barrel at the close of the year. Among the companies which have taken such action are Lehigh, Alpha, Universal Atlas, Medusa, Penn-Dixie, Edison, Allentown and Lawrence. These companies represent 53 plants with an annual capacity in excess of 100,000,000 barrels. In addition to these companies, a majority of the smaller plants in the East, and a number of those in the Middle West, have announced similar marketing methods.

Some of the companies have adopted variations in details but, in general, they are in agreement on the essentials.

The new marketing plan is the result of much thought and discussion over a long period among manufacturers, dealers and users. It constitutes an effort to overcome the defects of the old dealer discount system which had been the cause of much dissatisfaction among dealers, users and manufacturers alike.

This new method will enable dealers to sell at prices justified by the service they render—and, at the end of the year, to receive the service payment of 5 cents per barrel on all direct purchases from the cement company. In addition to the 5 cents service payment, the dealer will continue to receive the present 15-day cash discount of 10 cents per barrel. It permits the manufacturer to sell in carload lots direct to the user in localities where there is no dealer or where the dealer is not in a position to perform the normal functions of buying, selling and collecting.

For many years it was the practice of cement companies to quote large contractors and other large users of cement 10 cents per barrel higher than the quotations to dealers.

About five years ago this plan was modified to the extent of quoting the same price at a given destination to all buyers of cement; but the dealer differential was maintained by allowing a special dealer discount of 10 cents per barrel.

After a time some of the dealers began passing part of their discount on to the cement user. More recently the dealer competition for the big orders had become so keen that many of the dealers retained only 2 or 3 cents of the discount, passing the remaining 7 or 8 cents per barrel to the contractor customer. In some cases the dealers passed on the entire discount, retaining no profit for themselves.

The result of this practice among dealers was that the contractor frequently was able to buy cement from the dealer at a price below that quoted him by the manufacturer of the same brand of cement. This naturally led to the suspicion that some one was making a big profit in cement when, as a matter of truth, the dealer was giving away so much of his discount that he had little or no profit left.

While, as stated, the details of the new plan vary with different cement companies, the essential features are much the same with all of them. Under the new method all transactions between the manufacturer and the dealer will be on an outright purchase and sale basis. That is, the dealer performs all of the functions of purchaser and seller, carrying the accounts and assuming full credit responsibility on his sales.

As a separate and distinct transaction, the cement company will pay the dealer, at the end of each calendar year, a special service payment of 5 cents per barrel on the quantity of cement invoiced to and paid for by the dealer during the calendar year. The service payment will not be made at the time of payment of invoices. It will not be applied against unpaid accounts due from the dealer.

Contracts between manufacturers and dealers covering cement for use in specific work will provide for the 5 cents service payment.

In some cases the dealer may be unable or unwilling to carry out a complete transaction with a user. In such a case the cement company will deal directly with the user, the price being the same as to a dealer; but in this event neither the dealer nor the user will receive the 5 cents service payment.

Both approvals and disapprovals of the new marketing method have been received from dealers.

Fig. 1. Surface plant of the Detroit Rock Salt Co.

Produces Rock Salt from Bed 1,100 Feet Below Surface Near Detroit*

By H. D. KEISER

A description of the surface plant of the Detroit Rock Salt Co. was published in the Sept. 10, 1930, issue of PIT AND QUARRY. That article covered the hoisting of the raw material from the mine and its preparation into products. The present article, by the same author, deals with the underground operations of the same salt mine.—Editor.

A WESTERN miner, who somehow found himself "mining" in New York City on a subway construction job, is credited with having written a comrade out West, urging that he too come East and join him on subway work, "as it was just like mining in a parlor." Whether or no this story be true, I doubt that any miner could conceive of more satisfactory or "parlor-like" conditions than those found at the mine of the Detroit Rock Salt Co., situated seven miles from the center of Detroit, within the city's limits. The mine is dry, is excellently ventilated, and, except at the working faces, is electrically lighted throughout. No dust, steam, moisture, nor obnoxious gases are noticeable in the clear atmosphere. Mining operations, all of which are electric, produce comparatively little noise.

The salt bed, which is 30 ft. thick and readily drilled, lies in a horizontal position at a depth of 1,100 feet. Timber support of the roof is unnecessary. The only wood underground is in the form of ties supporting the haulage tracks. Electric drilling and blasting are employed, all firing being done at the end of the shift from the shaft bottom. Electric loading shovels and electric trolley haulage are used. Moreover, the mine workings, as well as the surface plant and surrounding grounds, are kept "spick and span." Certainly, the combination of all these desirable features at one property is unusual.

The aforesaid description might well warrant the

* Reprinted from *Engineering and Mining Journal* for Sept. 10, 1930.

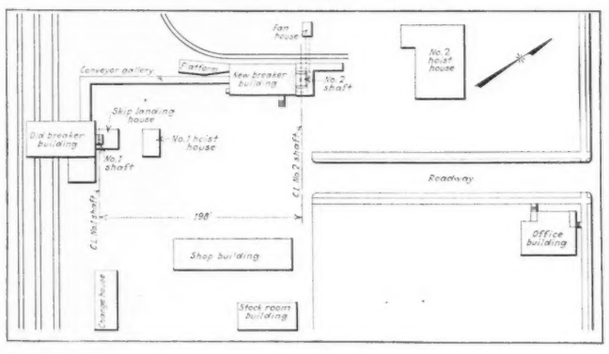


Fig. 2. General surface plan.

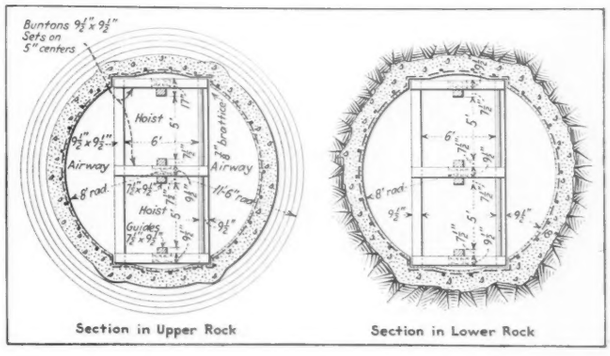


Fig. 3. Cross-sections of No. 2 shaft.

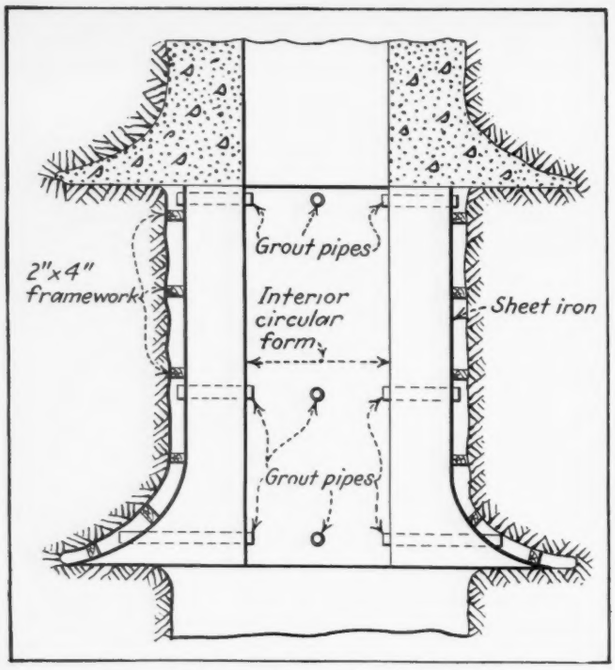


Fig. 4. Construction details of No. 2 shaft.

supposition that the management of the Detroit Rock Salt Co. has been especially favored in its operations by nature and other factors. This assumption, however, is not substantiated by the history of the property, which shows clearly that the present satisfactory conditions at the mine are attributable directly to the solving of several extremely difficult engineering problems and to the successful adoption of the most modern methods of operation to meet an exacting set of economic circumstances.

Operations on the tract began in 1906, when local interests started to sink an 1,100-ft. shaft to the salt bed. Following several reorganizations of the company, the shaft was completed in 1910. Subsequent operations of the company proved to be unsuccessful. A trying water condition confronted the management, more than 500 gal. per min. being pumped from the workings. Little or no labor-saving equipment was used. These circumstances, plus financial difficulties, resulted in the acquisition of the property, in 1912, by the then newly organized Detroit Rock Salt Co., a subsidiary of the International Salt Co. Operations on the property have been continuous since 1912, and a consistent effort has been made to apply, wherever possible, the most modern labor-saving equipment.

Of the economic circumstances, with which the management must contend, two of the more important may be cited here: (1) Inasmuch as the property is situated within the city limits of Detroit, operations must comply with municipal regulations, which are much more stringent than those applying to most mining companies. (2) The outlet for the company's products is restricted to a comparatively limited market, and its prices must compete with those of other companies that are favored by lower

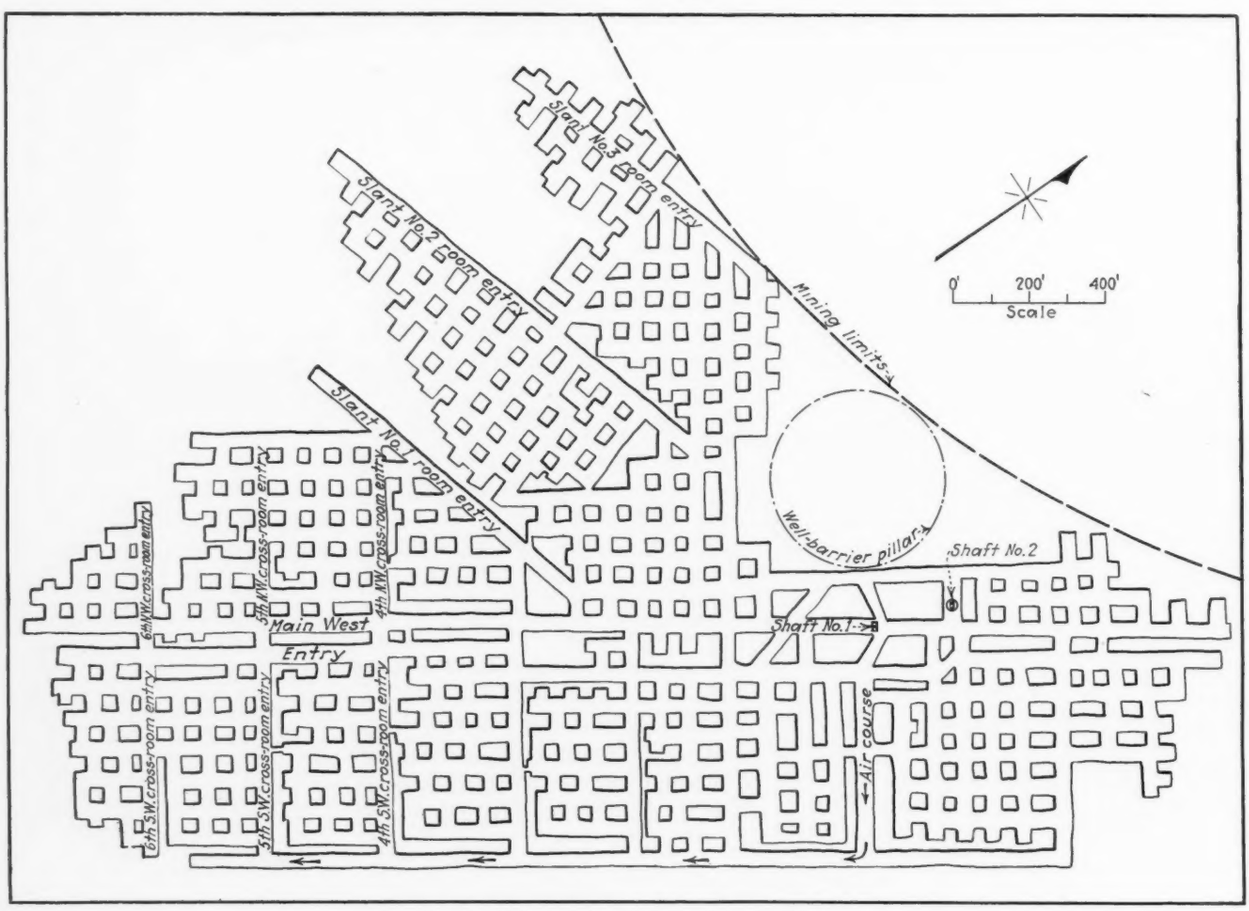


Fig. 5. Plan of the underground workings.

wage scales and less complex operating conditions.

The salt bed mined by the company occurs in or about the middle of what is known as the Salina formation, which, at the property, lies at a depth of 870 ft. Alternate layers of compact brown to drab dolomite, rock salt, anhydrite or gypsum, and then layers of bluish-black shale, comprise the formation.

stone and limestone, containing numerous watercourses. As the sandstone strata are porous and continuous to the Great Lakes, the water present is under hydrostatic pressure, which exceeds 235 lb. per sq. in. at a depth of 550 ft.

Two shafts, as shown in Figs. 1 and 2, are now in use at the property. No. 2 shaft, which is cir-

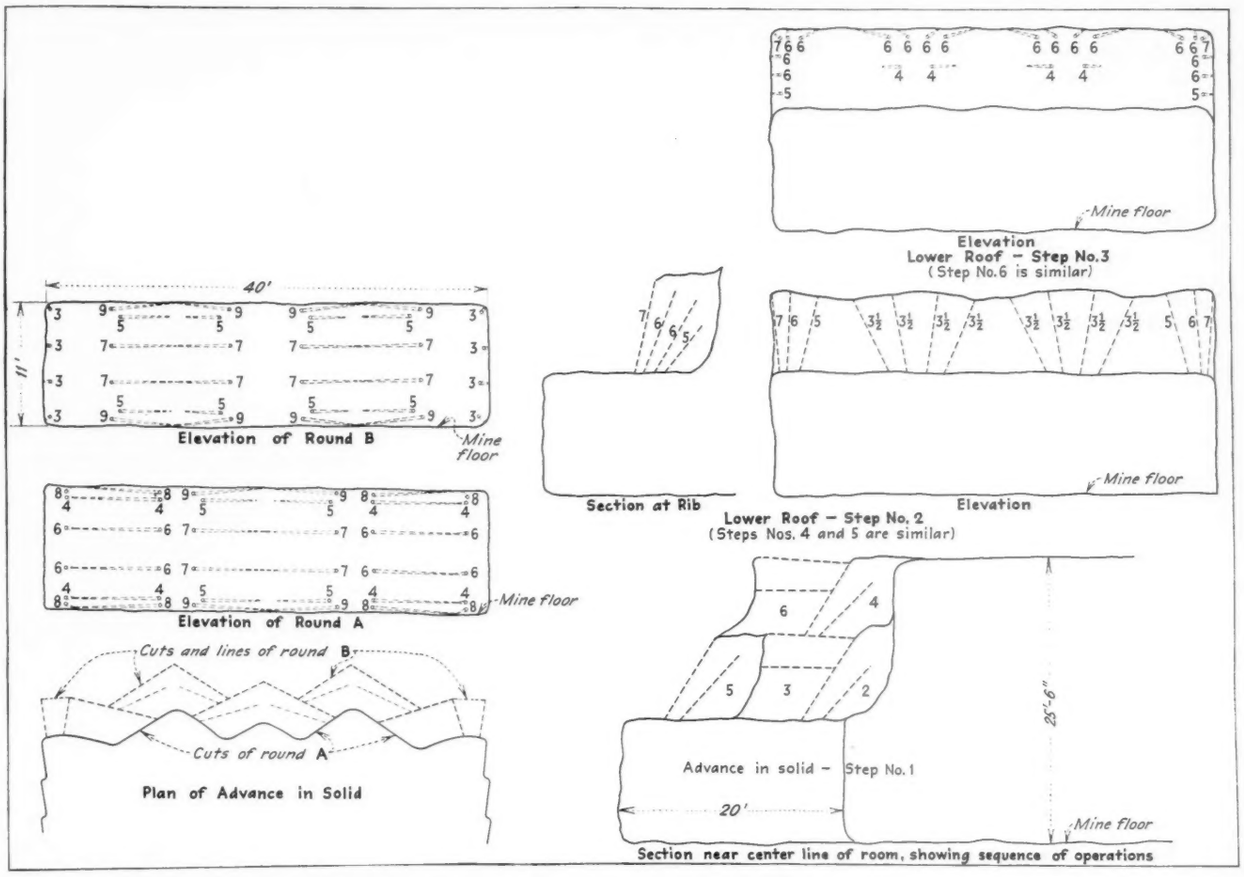


Fig. 6. Drilling and blasting diagram. Numerals at drill-holes indicate number of cartridges charged.

The entire Detroit district, which includes a land area of 772 square miles, is underlain by the formation, and the thick beds of salt in it are estimated to be capable of yielding unlimited quantities of salt. Notwithstanding this extensive area of the salt bed, the company's property is the only underground rock salt mine in Michigan. This distinction is accounted for by the extreme difficulty experienced in sinking shafts to the bed. A number of evaporating plants, however, obtain salt from one or more of the several beds of varying thickness that are found above the 30-ft. bed. The first of these is encountered at a depth of 900 ft. The salt is dissolved out of the beds with water, and the beds need not, therefore, be particularly pure. In underground operations, however, the salt mined must possess a high degree of purity.

From an engineering standpoint, the major problems at the company's property have been associated with shaft sinking. At the top of the strata that must be penetrated to reach the salt bed is 100 ft. of glacial drift, which is largely of quicksand consistency and highly impregnated with hydrogen-sulphide gas. Below this are about 600 ft. of sand-

cular and of concrete construction, was sunk in 1924 by the Dravo Contracting Co. No. 1 shaft was reconstructed by R. G. Johnson Co. in 1926. Attempts were made at No. 1 shaft, prior to its reconstruction, to control the flow of water with a concrete lining but, owing to the rectangular cross-section of the shaft, the linings cracked. Grouting was also tried, but without success.

Construction of No. 2 shaft was undertaken primarily to provide two openings to the mine workings and to obtain accurate information concerning underground water conditions. An interior diameter of 16 ft. and a lining thickness varying from 18 in. to 3 ft. 6 in. were adopted in designing the shaft, as shown in Fig. 3. The minimum lining thickness was increased in steps of 6 in. as the shaft progressed through the upper or water-bearing rock. On reaching the lower or dry rock at a depth of 672 ft., the thickness of the lining was reduced again to 18 in.; this thickness was used throughout the dry-rock section.

The first 94 ft. of the shaft was built on top of a cutting shoe, the material within the shoe being removed with a clamshell excavator as the shoe pro-

gressed through the soft strata. From this point, until the dry-rock section of the shaft was reached, sinking conditions were particularly difficult. The general method of construction employed in this section of the shaft consisted of first cutting a bearing notch in the shaft wall to support the weight of the concrete shaft lining extending from the last notch above. A framework of 2-in. by 4-in. timber was then erected to conform with the surface of the shaft wall, and sheet iron was fastened to this framework. Grout pipes, which extended from the space between the shaft wall and the sheet iron to within the interior circular form of the shaft lining, carried the inflow of water through the lining section.

The concrete for the lining was then poured, and, after it had set, grout under pressure was forced into the lower grout pipes until it flowed out of the pipes at the top, indicating that the inflowing water had been sealed off. All the pipes were then plugged. Construction of the next lower segment of the shaft lining was then begun. A sketch, showing the principal details of the method, is presented in Fig. 4.

The dry-rock section of the shaft was driven by raising from the top of the salt bed, raising and sinking operations meeting at a point 679 ft. below the surface. At a depth of 630 ft. a connecting tunnel was driven to a pump station at that elevation in No. 1 shaft. By means of this tunnel and station, which were below the water-bearing strata, adequate pumping and ventilation arrangements were made to cope with the water and hydrogen sulphide gas encountered in No. 2 shaft.

No. 1 shaft, as reconstructed, is undoubtedly unique in the mining industry. It consists, in effect, of a concrete monolith about 150 sq. ft. in cross-section and 1,100-ft. high that is pierced by two vertical circular tubes, each of which is 42 in. in diameter. These tubes are lined with 12-ft. sections of cast-iron pipe to a depth of 599 ft. but, from this point to the salt bed, they are unlined.

The shaft is now used solely as a man-shaft. Double-deck circular cages, carrying three men to a deck, and Otis elevator shaft guides, are employed. In reconstructing the shaft, the two 42-in. cast-iron pipe columns were built up from the 599-ft. elevation. The joints were caulked, and concrete was poured around the pipes and back to the rock as the work advanced up the shaft. A method of grouting, similar to that used in sinking No. 2 shaft, was employed to seal off various flows of water in the strata.

The underground workings are divided into two sections—namely, the Main West and the Slant sections, as shown in Fig. 5. A room-and-pillar method of mining is used, and an extraction of about 75 per cent is effected. Main haulage entries are driven 40 ft. wide and 300 ft. apart. Rooms are 40 ft. wide by 300 ft. long, pillars being 40 ft. square and spaced at 40 ft. No subsidence has occurred at the property.

Undercutting is not employed in mining the salt bed. The first 11 ft. above the floor is broken off the solid for a width of 40 ft. by alternate rounds of 36 and 32 holes. These rounds, each of which advances the face 3 to 3½ ft., are continued until a total horizontal advance of 20 ft. is made. The upper portion of the bed is then broken over the 40-ft. width by two series of rounds, each 7 to 7½ ft. deep vertically. Drilling and blasting details are shown in Fig. 6. In blasting, 60-per cent ammonia dynamite and electric caps are used. All firing is at the end of the shift from the bottom of the shaft.

Scranton Electric 220-volt drills are employed. The drilling tool is a coal-type auger, fitted with a special detachable cutter. This cutter, which is shown in Fig. 7, was developed by the company from one of a similar type that is used in the salt mines of Germany. The cutters are made from Star-Zenith steel stock in the company's machine shop. Actual drilling time for a 1½-in. hole, 9 ft. deep, averages about 1½ min. Five drills are operated, two men—a driller and a powderman—being assigned to each.

Bulldozing, or the breaking of large lumps of salt loosened in blasting, is effected by two different methods at present. In the Slant section, the lumps

Fig. 7. Special cutter used with auger-type drill.

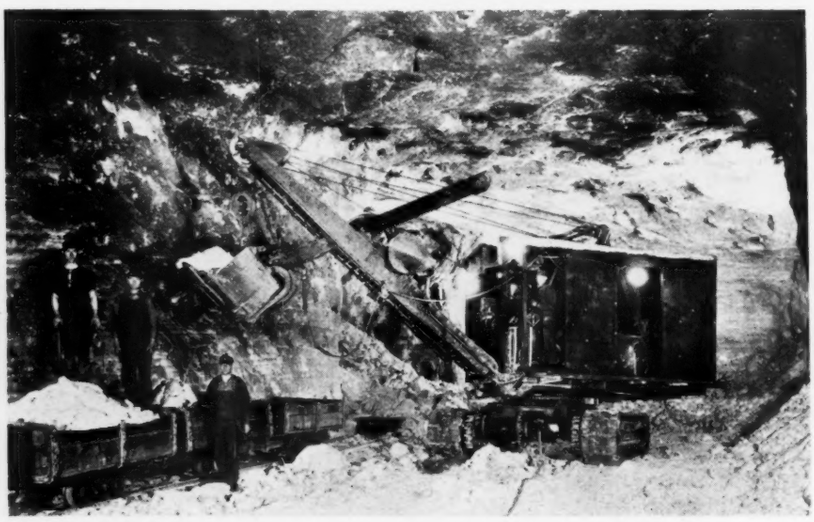


Fig. 8. Electric shovels are used to load the salt underground.

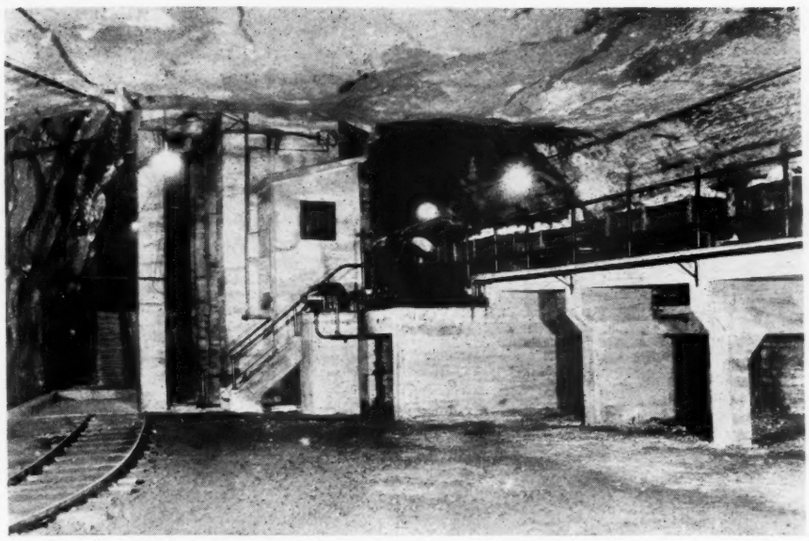


Fig. 9. Car haul, car dump, and No. 2 shaft substructure.

are drilled with electric Chicago Pneumatic auger drills, which are of the small hand-held type and drill a ⅞-in. hole. After being charged, the holes drilled in the lumps are fired at the end of the shift from the shaft bottom, in the same manner as the mining rounds. In the Main West section, however, tests are being made with Ingersoll-Rand and Sullivan pneumatic picks, with which the lumps are readily broken down into pieces of suitable size. "Bull points" for the picks are made on the property. Operating power is obtained from a portable, electrically driven I-R compressor of the railroad type that is readily lifted off the rails and blocked up whenever it is used in a new working place. A decision has not as yet been reached as to which method of bulldozing will ultimately be adopted throughout the mine.

The broken salt is loaded into 3-ton cars for transport to the hoisting shaft by a Marion Type-20 electric mining shovel, equipped with a ¾-cu. yd. dipper. Two of these shovels, one of which is shown in Fig. 8, are in operation in the mine—one in each section of the workings. From 1,000 to 1,500 tons of salt is blasted in a room before drilling is suspended and a shovel brought into the room. Each shovel loads about 600 tons or 200 cars per nine-hour shift. A shovel crew comprises three men: one shovel operator and two men who bulldoze the large lumps and extend the track as required for loading operations. The hoist and crowd movements of the shovel are performed by compressed air, which is obtained from a compressor situated on the shovel. This compressor is driven by an individual 440-volt alternating-current motor. A motor-generator set on the shovel converts the 440-volt alternating current delivered to the shovel to 320-volt direct current, which is used for all the other shovel operations. Transformers, situated at the bottom of No. 2 shaft, reduce the 4,600-volt current brought into the mine to 440 volts for delivery to the shovel and other equipment.

Loaded cars are moved by 4-ton General Electric cable-reel locomotives from the shovels to the main haulage lines, where trains of twelve to eighteen cars are made up and transported by 6-ton G.E. trolley locomotives to an electrically operated car-haul at No. 2 shaft. A track gauge of 38 in. is used throughout the mine, 40-lb. rail being employed on the main haulage lines, and 30-lb. rail in the rooms. A motor-generator set at the bottom of No. 2 shaft converts the 440-volt current to 220 volts for the trolley lines and the aforesaid Scranton Electric drills.

At the car haul, shown in Fig. 9, the locomotive is uncoupled, and the cars are moved, one at a time, onto an off-center car dump, equipped with a counterbalance and a spring-return device. Inasmuch as the cars have swivel couplings, dumping does not necessitate uncoupling. Only one man is required to operate both the car haul and the car dump. The salt passes from the car dump into two skip chutes, each of which has a capacity of 6 tons. In leaving the bottom of the shaft, the loaded skip automatically raises the lip of the chute, which, in this position, affords the storage capacity of 6 tons. When the empty skip descends, it automatically lowers the lip of the chute, and the salt therein is discharged into the skip. The capacity of the skips is 6 tons each. Ore-handling facilities at the bottom of No. 2 shaft were designed by the Allen & Garcia Co., Chicago, Ill.

(Continued on Page 45)

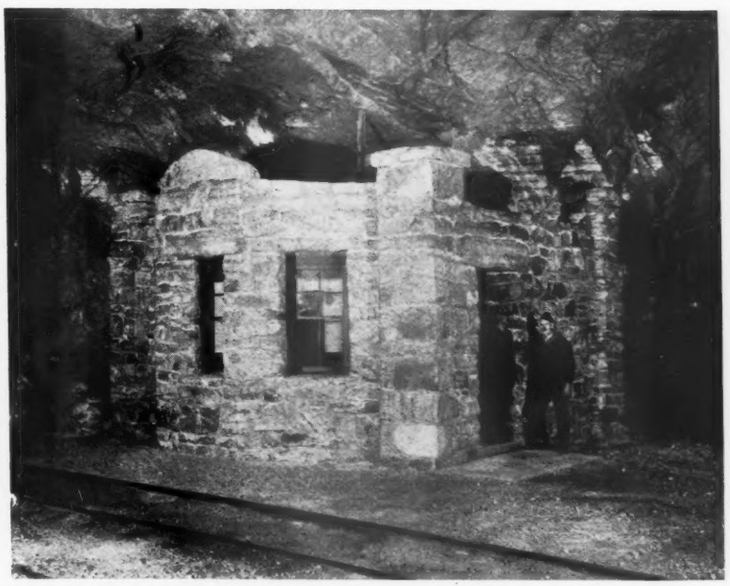


Fig. 10. The underground office is built entirely of rock salt.

A Study of Crawler Tractors as Applied to the Pit and Quarry Industry

By M. F. BEISBER

PART ONE

INTERNAL-COMBUSTION engines have made possible useful transportation and power devices which have become indispensable in our present-day social and industrial life. The usefulness of the automobile and truck have made their production America's greatest manufacturing industry, and the rapid development of the airplane indicates that another tremendous industrial giant is on its way.

Tractors—which are practically all powered by internal-combustion engines—have contributed a source of motive power which has meant success and profit to the farmer and has carved a niche for itself in the hall of industrial fame for its indispensable use in hauling heavy loads over otherwise impassable surfaces. For intra-plant transportation and around warehouses, docks and terminals, the use of tractors is well known. Equipped with many different attachments, they bore holes for posts, build and maintain roads, backfill ditches, hoist and transport heavy objects, and perform other utilities too numerous to mention.

Now that a period of plant reconstruction and improvement is already under way after a period of inactivity caused by slack business, many producers will be interested in improving their intraplant transportation methods. Crawler tractors, which have made their appearance in some modern plants, offer important advantages in handling difficult transportation problems. To point out these advantages, and to illustrate and discuss the various possible uses for this type of equipment, this article has been written. The first installment will discuss the development of the tractor and its uses in the pit and quarry industries; the second and third installments will describe the various makes of crawler tractors and all principal lines of equipment designed for their use.—Editor.

In recent years, operators of pit and quarry plants have become aware of their utility and have rapidly made use of them in hauling trailers laden with overburden, moving and "spotting" cars, shifting track, spreading and leveling waste piles and other duties about the plant. Tractors have definite uses. They are not a panacea for general transportation ills. Many tractors have not proved satisfactory because they were put to uses for which they were not intended. To present a cross-section of the use of tractors in the pit and quarry industries is the purpose of this article.

Types of Tractors

Tractors can be classified in two divisions: the crawler type and the lug-wheel type. The latter consists of the familiar machine so commonly used on farms for agricultural duty. Without the lugs, and equipped with solid and pneumatic tires, they are widely used for industrial hauling in and about warehouses and factories. The crawler type, which is equipped with endless-chain tracks picked up from the rear and laid down in the front, is adapted to meet certain soil conditions, impassable roads, snow-covered ground and rough surfaces over which heavy loads must be transported.

The feature of the crawler tractor is the fact that its weight is distributed over a wide area. The treads on the endless tracks of a well-designed crawler tractor do not carry any more load per square inch of surface than the pressure exerted per square inch by a man's foot. Therefore such a tractor will easily pass over any type of surface. This and many other features make the crawler tractor most desirable for pit and quarry use; in fact, it is the only type commonly found in this industry.

Benjamin Holt of San Leandro, Cal., is generally credited with the invention of the crawler tractor in 1900. The principle of endless-chain traction, however, dates back to 1691, when patent No. 277 was granted to Kendrick Edisbury in this quaint old English:

"William and Mary, by the Grace of God to whom these presents come greeting.

"Whereas Kendrick Edisbury hath by his humble peticon represented unto us that with great charges and much time he hath invented and found out:

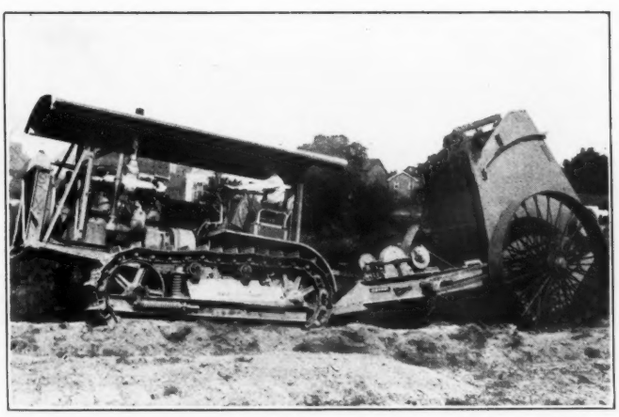
"A New Art or Invention of Certaine Rollers to be Used Under the Bodies of Carriages, Carts and Waggons instead of Wheels by Amending and Preserving as Well the Highways as Private Grounds which said invention was never used in England before and prayed us to grant him our Letters Patents for the sole use thereof, for the term of fourteen years."

A search through American patent-office records reveals the issuance of patent No. 61,344, in 1867, to Jesse S. Lake of Smith's Landing, N. J. Investigation as to the circumstances which brought about the invention proves that Mr. Lake, who was a foundry owner and general machinist, conceived the idea in an attempt to build a machine capable of transporting a load across the soft meadows and shallow bays between Pleasantville, N. J. and Atlantic City which is on the Absecon Sandbar, a distance of five miles. His invention consisted of a wide, endless-chain belt, traveling over single front and rear wheels. The belt was equipped with wide

wooden floats, and the wheels were flanged to keep it from slipping off. A platform, mounted to the crawler, supported from the wheel-shaft bearings, carried the load. The first vehicle merely carried its load as a wagon, and it was drawn by horses. It was an instantaneous success; in fact, the Dept. of Agriculture, in a bulletin of 1866, expressed enthusiasm over the possibilities of Lake's invention. Curiously enough, Mr. Lake's brain child was dubbed the "Hell Wagon" by the townspeople, because of the tremendous clatter it made. Mr. Lake is also credited with having built a self-propelling tractor using a crawler propelling motion, powered by a steam engine and boiler. History tells us that it was short lived, for apparently it shook itself apart.

The real development of the crawler tractor took place in California, where Benjamin Holt and Daniel Best were developing steam-driven, lug-wheel-type tractors for use in the peat bottoms of the Sacramento and San Joaquin rivers. California, with every conceivable type of soil, presented an ideal place to experiment with tractor machinery. Developments in the lug-wheel-type tractor tended toward bigger and better wheels, the last one produced in 1898 having wheels 8 ft. in diameter and 18 ft. wide. Mr. Holt soon realized that, with the increased size of wheels, the weight of the power and frame equipment increased in proportion, resulting, of course, in no tractive gain. In 1900, Holt produced his first crawler tractor. Matched with a 60-hp. lug-wheel type tractor, a 40-hp. Caterpillar easily out-performed the lug-wheel tractor. Not only that, it carried four gangs of plows as against three carried by the wheel-type machine and produced a 2-in. greater depth of cut. The first gasoline-engine-powered Caterpillar appeared in 1905. Its immediate success led to further development which became the nucleus of the Holt Caterpillar tractor, now manufactured by the same organization under the name of the Caterpillar Tractor Co.

The army tank, which proved so effective against the German machine gun attack at Somme, was developed by the British from a captured Holt Caterpillar tractor used by the triple entente in the Belgian invasion. Later, the French forces developed and introduced a light, one-man tank that was capable of considerable speed.



Stripping with an automatic wheel-type scraper.

The Nebraska Tractor Law

A law enacted on July 15, 1919, by the state of Nebraska has been of inestimable value in the design and sales of tractors, as well as to the industry at large. This law, known as the Nebraska Tractor Law, according to Circular No. 10, was enacted to encourage the manufacture and sale of improved types of tractors and to contribute to a more successful use of the tractor for farming.

"It was thought that the best method of accomplishing these objects would be to require a tractor of each model sold in the state to be tested at the state university and to have the results of these tests made public. These tests will give reliable information on the power capacity and fuel consumption of each tractor and also some information on endurance. The results of the test will be useful to farmers and dealers in making selection of tractors. Manufacturers also will, no doubt, find that the results of the tests are of some value to their engineering and sales departments."

Tractor-powered shovel for digging and loading materials.

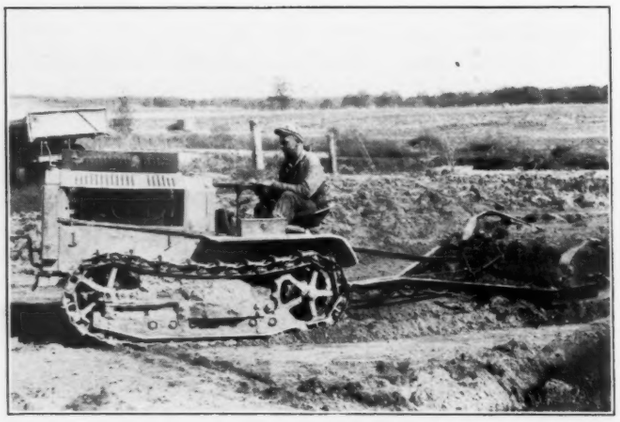
The provisions of the law require that a stock model of each tractor sold in Nebraska shall be tested and passed by a board of three engineers under state university management; that each company or dealer engaged in the sale of tractors in Nebraska shall have a permit issued by the state railway commission. After the tractor has been tested at the university and the performance compared with the manufacturers' claims, the permit is issued. A third provision requires that a service station with a full supply of replacement parts for each model of tractor shall be maintained in the state within reasonable shipping distance of the customers.

"It should be kept clearly in mind that these tests are not competitive. It is not the purpose of the tests to show any one tractor as being the best. No prizes, medals, or awards of any kind will be

given other than a statement of the performance of each tractor under test," says the same circular.

The tests as outlined by the board of tractor test engineers include:

(a) Drawbar work at from one-third load to full load for 12 hours. This test gives opportunity for the tractor to "limber up."



Loaded scraper being hauled to point of dumping.

(b) Brake horsepower test at rated load and rated speed for two hours. This test will show whether or not the tractor will carry its rated load on the belt; also show fuel consumption at rated load.

(c) Brake horsepower test at load varying from maximum to no load with all engine adjustments as in test (b) for one hour. This will show fuel consumption and speed control on varying load.

(d) Brake horsepower test at maximum load for one hour with governor set as in test (b) and carburetor adjusted to give maximum power. This will show the maximum horsepower of the tractor on the belt.

(e) Brake horsepower test at one-half load for one hour with governor set as in test (b) and carburetor adjusted for most economical operation at one-half load. This test will show fuel consumption at one-half load.

(f) Drawbar horsepower test at rated load for ten hours. This test will be made on a half-mile cinder track and will show whether or not the tractor will carry its rated drawbar load continuously; also show fuel consumption on drawbar work.

(g) Maximum drawbar horsepower test. This test will be a series of short runs with an increase of load for each run until the engine is overloaded or the drive wheels slip excessively.

(h) Miscellaneous. This may include investigation of work on inclines, turning radius, effectiveness of brakes, or any other feature of the tractor which may seem to require special observation.

(i) Tractors will be under observation for endurance throughout the complete test as outlined above.

It is, therefore, obvious that a tractor showing a satisfactory performance agreeing with the claims made for it by the manufacturer will be capable of performing the service for which it is sold. While this law was, no doubt, originally intended for the benefit of the agricultural industry, the general tractor-buying public profits from it. Anyone interested in the purchase of a tractor can, by writing to the Agricultural Experiment Station at the University of Nebraska, Lincoln, Neb., receive bulletins showing the results of these tests. The latest bulletin, published in March, 1930 (Bulletin No. 242), contains a complete summary of the tests of all tractors on the market Jan. 1, 1930.

A study of the Nebraska test figures will reveal many performance characteristics; indeed, these figures will furnish much food for thought. For instance, in the drawbar test at rated load, fuel consumption is expressed in terms of drawbar-horsepower-hour per gal. of fuel used. Remembering that a tractor is normally operated under full load for long periods of time, these test results become of great value since they show clearly the fuel economy. Similar results are given for the belt-performance tests.

Further study of the Nebraska test figures will refute the argument that there is a greater loss of horsepower through the crawler mechanism than through a lug-wheel mechanism, under similar operating conditions. In fact, a comparison between eleven models of representative makes of each of the two types of machines shows that the efficiency of the transmission and crawler mechanism of a crawler tractor averages 74.1 per cent, whereas the efficiency of the transmission and drive-wheel mechanism of the wheel-type tractor averages but 70.0 per cent. In other words, the loss of power between the motor and the drawbar is greater on the lug-wheel machine than on the crawler machine, under the same conditions of test which, in this case, was on the half-mile cinder track of the University of

Tractors equipped with hoists and derricks handling pipe-lines.

Nebraska farm. However, it must be clearly understood that each type of tractor has its place. The crawler machine can not and will not compare with the wheel-type machine for speed and the ease with which it can be maneuvered; nor will the latter compare with the crawler tractor under conditions of hard going. A large contributing factor to the cause of poor drawbar-horsepower efficiency is slippage of the wheels, causing the machine to dig into the ground. In recent times, pneumatic tires are

receiving wide-spread use in place of lug wheels. It is claimed by one prominent manufacturer that slippage has been considerably reduced by their use.

The efficiencies for this comparison were calculated from the "drawbar horsepower under maximum load" and the "belt test, maximum load, horsepower." The latter figure is taken at the end of the belt for all tractors which furnish a belt power-take-off. While an engine-dynamometer horsepower-test figure would be preferable in computing the drawbar-power efficiency, the belt horsepower is representative of the power of the motor in all cases.

Another test item of interest is the quantity of cooling water required, and its temperature during the test. While not a point of importance in localities of abundant water supply, this item means success or failure for the tractor in dry areas where the supply of water is limited or is difficult to obtain and transport.

Practically all present-day tractors are equipped with oil filters and air cleaners. These are of considerable importance as they protect the cylinder walls from grit and dirt particles that would otherwise enter through the carburetor intake. In sand and gravel and other plants likely to have dusty atmospheres, the use of a good air cleaner cannot be too strongly emphasized. As in other things, good and poor air cleaners are on the market, both used as standard equipment on the various makes of machines. It will pay the prospective purchaser to investigate the make and type of the air cleaner used on the tractor he contemplates buying.

The quantity of oil required is noted in each test. It goes without saying that this figure is a large factor in the operating economy of any tractor.

Use in Pits and Quarries

Removal and Transportation of Overburden.—In the field of non-metallic mineral production crawler-type tractors find one of their greatest utilities in the removal of overburden. Where the waste soil is light and dry, four-wheel elevating scrapers drawn by crawler tractors dig the material which is loaded into wagons also drawn by tractors. This method, of course, is practicable in but a small percentage of cases.

Usually, the crawler-type excavator is employed for the digging operation and for loading the dump trailers. One of the great advantages of the crawler tractor is demonstrated in its short turning radius when "spotting" trailers to be loaded by the excavator. In many cases, especially in stripping new deposits, surface conditions are such that wheeled vehicles move with difficulty, if at all. Crawler treads, with the weight of the tractor carried over their large areas, pass readily over the mud-holes and clay bottoms, drawing their loads with ease because of the tremendous traction afforded by the treads. Tractors will climb steep grades, over the roughest and softest soil, where other means will fail.

Stripping overburden with a bulldozer.

Dump-body trailers equipped with crawler treads make it possible to transport enormous loads wherever a tractor can travel. They have contributed greatly toward the reduction of stripping costs.

Hauling blasted rock with a crawler wagon. Note hydraulic-power dump mechanism.

A third field for the crawler tractor in stripping operations is its use in spreading and leveling dumped material. Where the material is dumped into old pits or quarries, it is generally poor practice to attempt to run the cars or trailers to the brink of the dump because of the risk involved. At the C. C. Beam quarry, Melvin, O., waste material is carried to the dumping point and the cars are dumped about 20 ft. back from the brink. A crawler tractor, equipped with a "bulldozer," moves the dumped material over the brink, or spreads it to any point desired. The advantage lies in the fact that the railway track is moved less frequently and the movement of cars is accelerated. The cars are not delayed while spreading the waste material.

Opening New Deposits.—At the Sunbeam Quarries near Clermont, Ky., an interesting use of the tractor was shown in developing a new quarry for the production of crushed stone. A crawler tractor, drawing a dump trailer, transported the overburden and brought the first stone from the quarry to the primary breaker. The new quarry, with its characteristic rough floor resulting from the first shots, presented a difficult transportation problem. The tractor and trailer were used for some time until the

quarry was developed far enough for the installation of a track system. In this instance, the tractor won praise for the part it played in opening the new quarry.

Transportation of Raw Material.—Tractors are not generally used for the transportation of raw materials from the pit or quarry to the plant. It is often a mistake to employ them for this purpose unless conditions warrant. Remembering that the tractor is primarily a slow-speed machine, seldom or never exceeding a speed of 8 miles per hour, its

Transporting blasted-rock from quarry to crusher.

use for transporting raw materials over normal road surfaces would not be justified, except for distances not exceeding, perhaps, several hundred feet. A crawler tractor is not a substitute for a field conveyor nor will it compete with a locomotive-and-car system on a long haul over a normal grade. Its place in transporting raw materials is a definite one. Where the run involves steep grades over poor road surfaces, nothing can out-perform a tractor. Where loading conditions place the trailer and tractor on sharp inclines, the tractive power soon demonstrates itself. An illustration of the crawler tractor in use for hauling raw materials is to be found at the Hercules Cement Co., Stockertown, Pa. At this quarry, a short, steep grade is encountered in running from the quarry to the plant. Four tractors, each with a 6-cu. yd. side-dump body, have made exceptional performance records, indicating the economy of their use under these conditions.

Loaded quarry cars hauled by crawler-equipped tractor.

Moving heavy pumping unit for hydraulicking in phosphate pit.

Finding the most economical method for raw-material handling is an engineering problem. It is safe to say, however, that, when other methods fail, tractors will usually provide the solution.

The great traction which is gained by using crawler treads is demonstrated when "spotting" cars. A string of two or three cars on an upgrade is just part of the day's work for a crawler tractor. For "spotting" cars at the loading bins it is particularly useful.

Many pit and quarry operators who employ the locomotive-and-car method of transporting materials to the plant know the amount of labor required to shift the tracks to new locations. The tracks must be taken apart in sections and dragged to their new positions by labor. With a tractor two methods can be used. Equipped with a bulldozer, the entire track can be moved without being taken apart. Of course, the tractor moves a portion at a time, but the job can be done quickly and with practically no additional labor. At some plants, instead of pushing the track with a bulldozer, a chain is attached to the drawbar of the tractor, and the track is towed to its new position.

Portable air compressors, crushers, pumps, and other heavy pieces of machinery are of necessity frequently shifted to new locations in the quarry. During rainy periods, when the roads about the plant are in poor condition for travel, no delay is experienced when a crawler tractor is at hand to perform the job. With portable plants, where the entire equipment is frequently shifted from one location to another on road-construction jobs, the tractor not only moves the machinery but, when equipped with a power take-off, supplies all the power required to run it.

General Utility.—A crawler tractor is as invaluable as a handy man for performing numerous duties about a plant. As an emergency source of power it is an assurance against shut-down. Equipped with any of the many attachments designed to utilize its power, it will perform the duties of several other machines.

For towing stalled or mired trucks and automobiles a tractor can be very useful. When equipped with a hoist, a tractor can easily move heavy machinery, crusher spiders and castings, conveyor understructures, posts, and similar plant equipment to new locations.

How Two Crushed-Stone Producers Save Money by Preventing Accidents*

PART I—By W. E. HILLIARD
General Manager, New Haven Trap Rock Co., New Haven, Conn.

MONEY can be saved by reducing the accidents in any concern. If a concern carries compensation insurance, it may perhaps benefit directly in getting a better insurance rate on its policies after it has demonstrated over several years that as a company it is a preferred risk. Also, it may benefit indirectly by the fact that basic rates are determined by the insurance companies on the average experience of a whole industry, so that if one or more concerns in an industry can reduce their accidents, eventually that will be reflected in at least a slightly lower rate among the various competing insurance companies.

If a concern carries its own compensation insurance, of course it is self-evident that fewer accidents with lower total payments mean an immediate saving directly in the firm's own bank account.

Aside from the humanitarian aspect, which has received much attention and wide publicity, the prevention of accidents in plants and quarries is distinctly important from the economic viewpoint.

This article presents the experience of two leaders in the crushed-stone industry on this particular phase of the safety problem.—Editor.

It is clear then that, whether a concern carries its own insurance or not, any reduction in its accident experience saves money in the end.

The company I represent has carried its own compensation insurance since it began business in 1915. While it is not safe to draw general conclusions from the experience of any one company, nevertheless, I am glad to present a brief statement of our experience in saving money directly in our own bank account by aiming constantly to keep down our accident hazards.

Our company operates one large trap-rock quarry located at North Branford, Conn., a small country town ten miles northeast from New Haven.

Our company employs about 130 men. Some years ago, we employed about 150 men. As is quite generally the case throughout our industry, the use of improved machinery and methods makes it possible for us to produce more stone per month with the smaller force now than we were able to produce with a larger force previously.

We operate a railroad six miles long from our quarry to rail connections with the N. Y., N. H. & H. Railroad and with our own dock terminal on Long Island Sound. During our operating season from 20 to 25 men, included in the figures given above, work on this railroad. During the three months or so when we shut down in the winter, nearly all the railroad men are released. In the quarry and mill at that time, our total working force is reduced to half of its normal size or less and is occupied mainly with repairing and overhauling the plant and machinery; although a certain amount of drilling in the quarry is carried on at favorable opportunities.

From the very first, it was decided that the company should carry its own compensation insurance. Each month an amount equal to 2 per cent of the payroll was set aside in the books of the company by debiting the compensation insurance expense account and crediting the compensation insurance reserve account. The 2 per cent was about what insurance companies would have charged us at that time, in 1915 and a few years immediately following.

Our quarry is in Connecticut and subject to the laws of that state. In 1915 weekly compensation for injuries was paid at the rate of half of the man's average weekly earnings during the preceding six months, or the average for a shorter period if he had not worked six months with that same concern, but with a maximum compensation of $10 per week; in case of death, his dependents were to be paid at the same rate for a period of six years.

Every two years or so the law was changed in some particulars, with the general tendency to increase the maximum for lost time or for death. Finally, about the year 1923, the law was changed to read, "an injury sustained in the course of his employment or an occupational disease." The maximum weekly rate was advanced to $18 per week. In 1927, by a further revision, the maximum was raised to $21 per week, which is the maximum at the present time.

The insurance companies naturally had to increase their rates considerably at different times to cover the added financial liability created by these changes in the law. In spite of that, it has been generally understood that most insurance companies, as a rule, have not made much profit on their compensation-insurance business.

Under the present status of compensation paid for lost time or for death from injuries sustained in the course of one's employment, many surprising cases came up in Connecticut for decision.

So much difficulty was encountered about the state in connection with cases of hernia that, in 1927, the law was revised. In our own company, we had several cases in this period. One man was operated on and awarded the usual weekly compensation and all hospital bills and medical fees of every sort were paid by the company. He claimed to have received a severe strain in the course of his work causing the hernia. He returned and worked for us several months and then left to go back to Italy. Be-

* Presented before the Quarry Section, 1930 National Safety Congress, Pittsburgh, Pa.

fore going he told some of his fellow workmen with great delight that he had put one over on the company in connection with his operation because he had sustained a hernia in Italy several years previous. A doctor in New Haven advised an operation and so he thought he might as well try to get it out of the company. Many concerns in Connecticut endeavored to have physical examinations made of all new employees, partly to prevent cases like this from arising. Of course the expense of many such examinations would soon amount to the total cost of one hospital case. In 1927, the revision states that "an employee must prove that the hernia resulted from an accidental injury, that inability to work immediately followed such accident, that there was not a pre-existing hernia at or prior to the accident, and that any claim on account of hernia must be made within two weeks of the alleged time it was incurred."

This reduction in risk in hernia cases is one of the few changes in favor of the employers in the last fifteen years, as practically all the changes in the law have been in the favor of the employees. I do not question the wisdom of the present law in Connecticut, as we all agree that full and amp'e protection must be awarded all workers. I am merely making the point that it has become steadily more and more expensive to pay for accidents; and, therefore, any substantial reduction in accidents, means a much greater saving than would have been the case ten or fifteen years ago in the same circumstances.

From time to time, we raised the rate we charged ourselves in our Company which was 2 per cent of our payroll in the beginning until we reached the rate of 5 per cent which was about what we were quoted by insurance companies if they were to get our business.

At the end of fifteen years ending December 31, 1929, we had accumulated in our reserve account $74,900. This represents the amount left in the reserve after having deducted all the payments we made on account of accidents. At first sight, it would appear that we had saved that amount of money in fifteen years by carrying our own compensation insurance. There are, however, a number of important offsets.

In the first place, we may have charged ourselves somewhat more than the rates we would have had to pay during this time. If we had charged ourselves 10 per cent to 15 per cent more than the insurance companies would have charged, our reserve would now be $7,500 to $10,000 higher than necessary.

In the second place, we have some unpaid liabilities against this reserve. If tomorrow at noon some insurance company were to accept our policy and we no longer carried our own risk, any accidents after noon to-morrow would not be our responsibility. We would, however, have to keep on making weekly payments to several widows and several men now receiving compensation for injuries. Probably from $7,000 to $9,000 would be required for that purpose. The exact figures could not be ascertained in any way in advance because such risks are contingent. If the widow of a man who is accidentally killed has no children and is receiving compensation, and was the man's only dependent, in the case of her own death before the six years is up, the compensation ceases. If there were children, and the widow herself dies, the children would receive a portion of the original award each week, but not the full amount. If a man who has no dependents is permanently crippled and cannot work, he receives compensation for ten years, but in the event of his death, such compensation ceases.

In the third place, in connection with the federal income tax, and with the state income tax in Connecticut which is figured much in the same way as the federal income tax of corporations, we have had to pay more taxes than we would have paid, had we not carried our own compensation insurance. For instance, in the year when we first started, assume that we set up as a liability, $10,000 in our reserve account and charged off that $10,000 as expense. The actual payments checked out for medical services, hospital bills and compensation claims in that year we assume to have been $7,000. We would then have $3,000 left in our reserve at the end of the year. If we had actually paid an insurance company $10,000 as a premium that year, of course we could have deducted all that amount as an expense of operating for the year, in computing our federal income tax return. In our own case, however, the government officials would hold that we could only deduct the actual amount paid out which was presumably $7,000 and they would hold that the remaining $3,000 was really a part of surplus since it was still in our possession on the last day of the year. In computing our income-tax return, we, therefore, would have to use the figure of $7,000 instead of $10,000 as our deductions from gross income for compensation insurance expense that year. The result would be that the final net income for that year on which we would have to pay taxes would be $3,000 greater than our own books showed.

The federal income-tax rate as you may recall, was 1½ per cent or 2 per cent for corporations about 1915 and 1916 and then in wartime ran up to 15 per cent. After the war this rate of 15 per cent was gradually reduced until in the last calendar year it was 11 per cent. If we should assume that the average during the last fifteen years is approximately 10 per cent, than we have paid out in the fifteen years about $7,500 more for federal income taxes than we otherwise would have paid and about $1,500 more income taxes to the state of Connecticut than we would otherwise have paid. You understand, of course, that all actual payments for injuries or death claims or medical and hospital bills in any one year can be deducted in that year. If we had one disastrous year in which many expensive accidents occurred, so that the payments made by us amounted to a large sum, say $25,000 or $30,000, we would only charge off against that year the usual 5 per cent or so of our payroll and the rest of the total amount paid would come out of the reserve carried over from previous years. In our federal income tax and our Connecticut income tax return for that year, we, therefore, would deduct a much

larger figure for compensation insurance than our own books call for in that year. In other words, if we set up $10,000 a year for five years, it would make $50,000. If we paid out $7,000 a year for five years, it would make $35,000 leaving $15,000 in our reserve. If we set up $10,000 for the sixth year, added to the balance of $15,000, our reserve would then equal $25,000; but if a series of bad accidents in the sixth year amounted to exactly $25,000, it would just use up the total reserve. In our own books for that year we would have only the $10,000 expense charged off, but on the federal income tax return, we would be allowed to deduct the whole $25,000 paid out in that year; so that we would pay income tax on a much smaller total net income that year than our own books showed.

In the fourth place, an insurance company naturally takes full charge of all claims. Accidents are reported to them and they do the rest. When a concern carries its own insurance, it is necessary to spend a considerable time, over a period of years, in having the claims checked up, papers made out and signed, hearings arranged with the commissioner, payments made at required intervals to the different claimants and closing up the records when each one has been paid in full.

My assistant and I, during the past fifteen years, have undoubtedly spent many hundreds of hours more in attending to these matters than we would have if we could have turned the settlement of these claims over to the representatives of an insurance company. Our time for this work has undoubtedly cost the company several thousand dollars in all during these fifteen years.

Our figures may therefore be revised as follows:—

Present reserve, after 15 years....		$74,900
Less 12% more than insurance premiums might have cost.....	$9,000	
Less claims now running to be paid in the future.....	9,000	
Less extra income taxes paid.....	9,000	
Less administration and clerical labor	3,000	30,000
		$44,900

It appears, therefore, that, as a very conservative estimate, our company has saved approximately $45,000 in fifteen years which is a rate of saving of about $3,000 per year for the entire period. I am of the opinion that this figure is quite conservative and that a long and exhaustive analysis carefully computed would probably show that in my estimate I have deducted somewhat more than I should have from our present reserve to arrive at the figure of $45,000.

I have endeavored to state our company's experience as concisely as possible, but do not wish to make it appear that I am necessarily advocating the plan for a quarry company to carry its own insurance rather than place it with an insurance company.

We have had a favorable experience, but it is evident to you all that during the first few years, say from the first year up to the sixth or seventh year, we were running a very considerable risk. A series of bad accidents during those early years might have obliged us to pay out large sums of money far in excess of what we had set up for that purpose.

There are a great many factors to be considered in determining whether or not a quarry company should take this very considerable risk during the early years while it is building up a reserve.

I ought to explain that we have been able, during the last few years, to obtain supplementary insurance for exceptional risks. We are now paying $880 a year premium to one insurance company, by the terms of which policy that company will pay for any losses incurred by us in any *one* accident which amounts to more than $10,000, their total liability not to exceed $100,000. In other words, if we had an accidental explosion in which severe and fatal injuries occurred to a group of men amounting in all to damages of $25,000, we would be obligated to pay the first $10,000 ourselves and this insurance company would have to pay the remaining $15,000. This policy, however, is limited to any one accident. If we had three bad accidents, one week apart, each causing liabilities of $8,000, we would have to pay the whole $24,000 ourselves. However, we regard that excess insurance as well worth while for us to carry as a partial protection against some unforeseen catastrophe. That form of excess insurance has been developed by the insurance companies especially for concerns like ours who carry their own regular compensation insurance.

We have been fortunate in having one very able superintendent for our whole quarry and plant, Alexander McKernan, in charge during the entire period of fifteen years. He has always been keenly interested in the welfare of his men and has had a great deal of influence in training them to be careful. We have also had one man in charge of our crushing mill and one man in charge of our blasting and quarry operations during this entire period. No doubt we would have had many more expensive accidents except for the care and attention that these three men have given to accident prevention.

The subject of this discussion is "Saving Money Through Accident Prevention." I have therefore endeavored to confine my remarks to that particular topic, but it is entirely impossible to consider this question, even briefly, without keeping in our minds the fact that human life and human welfare are of fundamental importance and that in company, as in the industry in general, we are far more concerned with saving human life and preventing human suffering than we are in the financial side of the question. If these two considerations came into conflict, the problem would be terrific. Fortunately, these two problems are both on the same side. By preventing accidents, we save human life and reduce human suffering and, in addition, as a secondary motive, save money. We believe our whole industry, which is necessarily somewhat hazardous, has before it a splendid opportunity in the future—by giving its enthusiastic interest and support to accident prevention—to reduce its accident rate and thereby reduce the sum total of human suffering and disaster.

PART II—By O. M. GRAVES
Vice-President, General Crushed Stone Co., Easton, Pa.

THREE years ago, in October, I had the pleasure of attending the Safety Congress in Chicago. I knew little or nothing about accident-prevention work. It was much to my astonishment that I learned I was to appear on the program of that Congress to talk on accident-prevention work. However, if my talk had no value to anyone else, it had to me because it forced me to investigate the subject, of which I was fundamentally ignorant, and threw me into the atmosphere of men who were trying earnestly to prevent accidents.

O. M. Graves

It sent me home with an enthusiasm which I believed it impossible for me to possess. I believed, as the other officers of the company did, that we did as much as possible to prevent accidents; we told the superintendents we didn't want men to be hurt, and expected them to pass this along to the men.

If anyone called our attention to physical hazards that needed remedying, we quickly remedied them; that was the extent of our work—a rather receptive sort of interest. We were ready for suggestions, and to follow them when they should be made, but we were not on the alert, seeking the things that were hazards and seeking methods to change and improve things to lower the frequency and severity rate.

At that time we had a severity rate of about seven days for one thousand man-hours of exposure; this one thousand naturally meaning one hundred men working a ten-hour day; that is to say, every time a hundred men work for a day, seven days of time was lost. The frequency was one in a million man-hours of exposure.

I think, as those figures might be compared to the average, they were not so reprehensible as to cause great concern; they were neither good, bad, nor indifferent, neither fish, fowl nor good red herring—somewhere near the average of the industry, not bad enough to disturb our conscience, nor good enough to awaken our enthusiasm to better them.

We gave a good deal of thought to what could be done to prevent accidents after that Congress three years ago. We were just as fully alive to the humanitarian standpoint as anyone else; perhaps no more, but fully as much. Perhaps we were somewhat more alive to the humanitarian side of it by reason of the interest our president, John Rice, has in every member of our organization; but it seemed to us that if we could in some manner tie up the expense to which we were put by virtue of accident to a more energetic campaign to prevent accidents, we would have that material and financial interest in the success of the plan which would do fully as much if not more to stimulate effort than if we had only the humanitarian point of view.

It seems like an admission from a material mind to say that when things become costly we become immediately alarmed. Our consciences are so pliable, so adjustable to conditions as we find them, it is easy to keep our consciences square on the line all the time, to say "Are we not doing as well as could reasonably be expected?" and content ourselves with axiomatic expressions, letting us out of responsibility; but when it was brought home that every time an accident occurred it made a direct drain on the finances of the company, someone is going to begin pressing on why it happened and what can be done to prevent it recurring.

Therefore we decided—I am telling you the way we were thinking things out, and are still—it would be an advantage to try the experiment of carrying our own insurance.

At that time our premiums amounted to $50,000 a year to insurance carriers. That was for a number of plants, not nearly so great as now. It seemed to us there was a fund of $50,000 with which we might play; if we could do it for less we would be better off financially; should it cost more—I doubt if it could, unless there was some catastrophe, unless there should be an abortive explosion. Dynamite is treacherous; you never know quite how it will act; in carrying it up a hill, dropping sixty, seventy, even eighty quarts of nitroglycerine into the hole, five, ten, twenty-five feet, it is impossible to say what will occur always, and if that unexpected thing happens there might be an explosion that would kill five or six men.

You New York men can estimate how much it costs to lose a life in that commonwealth: anywhere up to sixty or seventy-five thousand dollars. Losing six or seven might be so costly that it would outweigh any advantage you might get out of a $50,000 fund such as we were playing with.

That led to investigation as to whether a "stop loss" order might be taken out—a catastrophe insurance. We found it could be obtained, but that it would be difficult. The insurance companies search the records of a company with extreme care, to observe how it is conducting its operations, if it would be a warrantable risk. We were helped in that connection by the Independence Bureau in Philadelphia which undertook to assist us in accident-prevention work and which spoke reassuringly to the insurance carrier which was large enough to carry insurance of that type. So we secured insurance to the extent of $250,000 covering any one accident above $10,000. That is to say, if we killed a man in any manner whatsoever we would be liable for the first $10,000 of compensation, but above that our liability would cease and the insurance policy

would pick it up and carry the loss up to $250,000, above which we would be liable. We assumed it would be beyond the realm of possibility that any one accident could cost us more.

Now, I am sure what I mean there is clear, and if an explosion occurred unexpectedly, and four, five or six men were killed by that one accident, our loss was limited to $10,000 no matter how many were killed.

With that protection giving us a better feeling of security, we undertook to carry our own insurance.

The point is that, as soon as we realized that we were launched on this plan, that no one was going to pay our losses but ourselves, that all compensation, all medical expense, was to be paid by ourselves, it became obvious that it was incumbent upon us to reduce those accidents to the lowest possible limit. That we undertook to do.

I am not going into the ways and means of accomplishing that. We have found during the two years and a half we have been doing it, for 1928, 1929 and approximately the first half of 1930, that our net premiums to insurance companies would have been approximately $128,000.

We actually spent in compensation for accidents $22,000; our medical attention amounted to $7,600; administration costs were $36,000. The administrative cost can be decreased as time goes on; for instance, for the first year it was $13,000 and for the first half or two-thirds of this year it was only $9,000. That difference is not altogether accounted for by the fact that the year is not completed, but is also attributable to over-zealous effort at the start, and expenditures which were perhaps justified at first, which we have found can be saved; making the total cost to us during this two-and-a-half-year period approximately $66,000 as compared with the amount we would have paid in premiums.

That is, you may think, not so great a saving, but as I know the profits of crushed-stone companies, it is a fair profit in itself, and furthermore, made in the finest sort of way. Not by reducing the cost of operations and increasing prices to consumers, by being a little sharper or shrewder than your competitor, but by benefiting the people working for your company. I know no better way than by helping someone else to protect himself from being hurt, to keep himself from the suffering, and his family from the grief and sorrow that comes when any member is injured or killed.

So I am gratified by the saving of the $62,000 made in this period, not simply because the saving represents a reasonable profit on what we have undertaken to do, but also because of its humanitarian aspects; that is the thing I want to emphasize.

That is the way to think of it, it seems to me. Perhaps I have rather lost my perspective on the subject; but it does seem to me that neither purpose is complete without the other, that the two should go hand in hand. If we reduce accidents, we should benefit financially, but we should have two reasons: avoidance of sorrow, grief and suffering to the man and to his family, and the profits which would rightfully accrue to the company effecting the saving.

I realize that a plan of this sort is not applicable to all companies; I can understand that the number of men employed by a company might be insufficient to warrant such an undertaking; I am not prepared to admit, but I might be convinced.

It seems to me a man operating one plant, with 25 employees, has a better opportunity to prevent accidents than a company operating fifteen or twenty plants with 1,000 employees; by the very nature of the widespread activity and operation, it is more difficult to give each plant the personal, earnest attention which it deserves. Whether from the operating, selling, or accident-prevention point of view, that fortunate man who lives with the plant he owns, lives right there with it all the time, its seems to me, ought to be able to operate more economically, sell to better advantage, and prevent accidents to a greater extent than the large company.

That may be so, but insofar as there is any truth in it, he has the opportunity to prevent accidents which would warrant him in carrying his own insurance.

I would regret to have what I say reach the ears of an insurance company to indicate a lack of knowledge on my part of the value of insurance. We all realize we must be insured in some form or manner, against the vicissitudes of life, whether personally or affecting the conduct of our business. There is not a man here who would dare to drive his car in the city or state without insurance; many carry public-liability insurance, which we carry, for instance. In one plant we still carry compensation insurance with an insurance carrier, in Massachusetts. I have observed with the greatest pleasure the work the insurance carrier has done there in assisting us to reduce accidents to a minimum. I am in sympathy and accord with insurance.

We could not be without some protection behind what we are doing; that would be some form of insurance, whether a deferred account on the books of the company or some form of insurance, would depend on the individual case. I am simply talking about workmen's compensation insurance, and for us it has proved profitable to the extent indicated. I am aware, as our record has improved, our manual rate would be reduced with the carriers and it is difficult to set up this figure of $128,000 as the probable amount we would have paid, as it would have been decreased by our record, but I listened with secret pleasure to what Mr. Quigley said this morning that, in arriving at the manual rate, there is a good bit of throwing everything into the hat, and stirring it up, and pulling out something and giving it to you. That is not altogether fair (though I appreciate what he means) to the insurance company. He knows, even better than I do, that insurance companies have a definite manner of arriving at the manual rate. I think his suggestion of classifying the quarries has decided merit, but without knowing about it from the insurance man's stand-

(*Continued on Page 50*)

Plant of the Western Massachusetts Sand & Gravel Co.

Design of Massachusetts Gravel Plant Saves Wear on Conveyor Belt

Fines Deposited First Form Protective Cushion for Heavier, Abrasive Material

TO guard against more than normal wear on the conveyor belt, the layout of the new plant of Western Massachusetts Sand & Gravel, Inc., at Westfield, Mass., provides for the discharge of the undersize gravel and sand onto the belt before the more abrasive crushed stone reaches it.

The sponsors of this company, Gladwin & Lane, are large building-material dealers in the same city. The officers of the gravel company are: Robert P. Lane, president; H. W. Augerson, vice-president; H. W. Gladwin, treasurer; and R. T. Minor, corporation clerk. The plant was designed by the Anderson Engineering Sales Co. of Brookline, Mass., which furnished all the machinery except the electrical equipment and the pump, these being supplied by the Fairbanks-Morse Co.

The sand-gravel deposit was selected after prospecting all the available deposits within trucking distance of Westfield, Springfield and Holyoke, Mass., in which lies the market for truck delivery. There are a few million cubic yards in the tract, varying in depth from 40 ft. to 60 ft. above grade. This is approximately 20 ft. above mean high-water in a branch of the Westfield River which passes within 400 ft. of the plant site. The deposit is of glacial origin. Most of the gravel is less than 10 in. in size. It is chiefly close-grained, hard granite and very tough quartz. The sand is sharp and well graded. Tests on both materials just as taken from the bank, unprocessed, have been made by state and private laboratories, with gratifying results. The deposit averages about 60 per cent gravel over ¼-in.

The material is excavated by a Sauerman standard-type Crescent bucket operated by a 40-hp. motor on a Sauerman hoist. This unit drags the material to a 6-cu.yd. hopper of the inverted-pyramid type over which is a rail grizzly. An Anderson-designed Sturtevant feeder with an adjustable eccentric to allow variations in feeding, discharges into a 40-in.-diam. revolving screen, with 2-in. perforations.

In the scalping operation, the minus-2-in. material is chuted to an 18-in. belt conveyor. The oversize is dropped into a small hopper above the jaws of a Wheeling No. 1030 roller-bearing crusher, with a setting to produce nothing over 1¼-in. in size. The decision to use this crusher was made because of its ability to definitely produce a well-sized stone (thereby eliminating a closed circuit) and of its high capacity at a very low power requirement, due to the anti-friction Timken bearings.

The conveyor assembly itself is 148 ft. in length. Rex-Stearns Timken troughing idlers were selected, and the belt is equipped with a gravity take-up, so often overlooked in other than the very large plants, yet so desirable in providing a proper belt tension constantly. The belt returns on Rex-Stearns helical-bearing idlers. The belt is an Iron Clad, manufac-

tured by the Boston Woven Hose and Rubber Co.

Discharge from the conveyor is onto a launder, designed to completely scrub all sand and clay from the gravel. At the head of this launder the initial water is introduced at the rate of about 200 gal. per min. for washing and sluicing to the head baffles of a single-surface Leahy No-Blind vibrating screen. Here a definite amount of water—determined by long experiment in other operations—is sprayed in five places on the gravel as it passes down the screen.

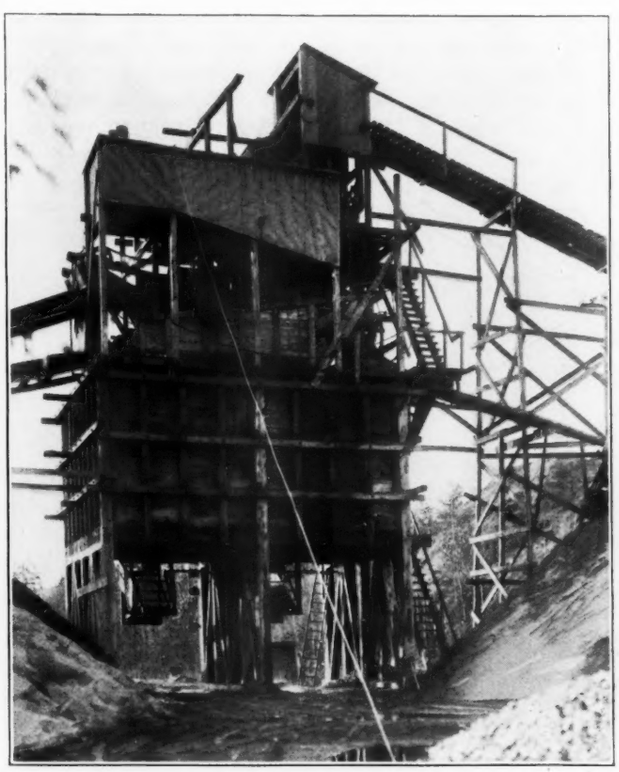
The plus 1¼-in. gravel is screened off, while the undersize is carried to the head end of a two-surface Leahy screen directly below. Water is applied in the same manner on this screen which separates the materials under ¼-in. and over ¾-in. The arrangement of the screens and the application of the water produces remarkably clean stone—a feature of the plant that attracts attention.

The screens are driven by individual motors of 1-hp. each. These motors are direct-connected and furnished by the screen manufacturer.

The minus-¼-in. product is sluiced to a 14-ft. paddle-type sand-drag of improved design. The details of this were worked out by the Anderson Co. in collaboration with the Chain Belt Co., which manufactured it. Ley-bushed chain of 6-in. pitch is employed with paddles of flights spaced every other link. The results of this change of design have been found superior, especially in producing a very dry sand.

A Diesel-driven, 80-hp. generating set operates the entire plant, including the drag-line, through ball-bearing electric motors, totaling 97 hp. This is considered the lowest horsepower in any eastern plant of this daily capacity. Plants producing 750 tons per day, as this one does, are usually operated with 200 hp. or more. The complete installation has attracted attention in New England and has been commented on favorably by the many older sand and gravel producers who have seen it.

Open stock-piles of sand and various grades of gravel are maintained, the materials being handled into and from storage by a Barber-Greene crawler-mounted loader.



Side view of bins and superstructure. Inclosure on top of incline houses vibrating screen.

Looking up conveyor incline. Ground storage for sand is seen in the background.

Produces Rock Salt Near Detroit

(Continued from Page 33)

Both No. 1 and No. 2 shafts are used as upcast shafts. A curtain wall in No. 2, however, provides a downcast-air compartment outside of the hoisting compartments. An American Blower Sirocco No. 10 single-inlet fan supplies 50,000 cu. ft. of air per min. in the summer, and about 25,000 cu. ft. in the winter. The air is heated during the winter by passing it over steam coils at the intake side of the fan.

The total inflow of water into the mine is only 1½ gal. per min. This water is stored in two large barrels near No. 2 shaft and is pumped to the surface by two Goulds triplex pumps, pumping operations being limited to two or three hours per day. Mine operations are on a single nine-hour shift basis. At present 42 men are employed underground. The normal rate of output is 900 tons per day. During capacity operations, however, the daily output is 1,500 tons.

Panoramic view of the Jaeger plant showing stock-pile arrangement.

Entire Sand-and-Gravel Plant Moved to New Deposit in Slack Season

Wisconsin Operator's Business Grows to 150,000 Cu. Yd. Annually Within 10 Years

MOVING an entire sand and gravel plant from a depleted pit to a new location is considered a big job for the winter period of production inactivity. A Wisconsin producer not only made this change, but enlarged his facilities in the transfer, building an attractive new garage-office building and adding many new items of equipment, all in time for the opening of the spring business in May of 1930.

A story of this company, the Jaeger Sand & Gravel Co., of Milwaukee, Wis., would not be complete without a tribute to its president, Henry Jaeger. Here is a man who, in 1920, started a trucking business with $250 borrowed capital and a second-hand truck and who has, in ten years, built one of the finest aggregate plants in Wisconsin representing an investment well in excess of $100,000. Mr. Jaeger's entrance into the sand-and-gravel business came about through his early efforts as a trucking contractor, hauling aggregates and coal from the various pits and yards in and about Milwaukee. In those days he was not only driver of the truck, but manager of the business, maintenance man, bookkeeper and salesman.

His first venture in the aggregate business began with a bank-run pit in Wauwatosa, Wis. This location was soon succeeded by another on the Curtis Road west of West Allis, Wis. No materials were processed until the plant was moved to Brookfield, Wis. At this location, the Jaeger Sand & Gravel Co. was organized and incorporated in 1925. The incorporators were Henry Jaeger, president; Henry Gepfert, vice-president; Walter Lass, secretary; and Wm. Frentz, treasurer. Since the death of Mr. Gepfert, Mr. Frentz has become vice-president and treasurer.

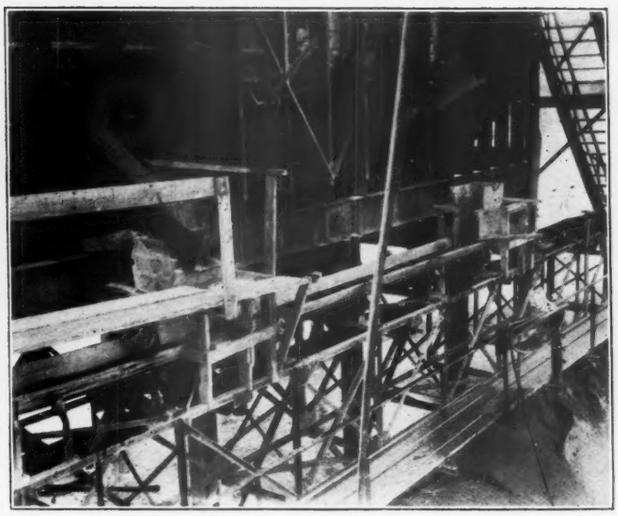
As business grew, the capacity of the Brookfield plant became inadequate to supply the volume of material to be trucked out each day. In addition, the pit became depleted of its better quality of material and, for these reasons, the Jaeger company set about, in the fall of 1929, to relocate the entire plant and to enlarge it to meet the increased demand.

Situated within 15 miles of Milwaukee, the new plant is on a tract of 80 acres of land near the well-known Prospect Hill, one of the highest points in Wisconsin. With the present capacity of 150,000 cu. yd. per year, it will require more than twenty years to deplete the deposit.

Three P & H machines, two of which are cranes

The Jaeger plant with scalping screen and crusher in foreground.

Crawler-mounted crane operating in pit.



Close-up view of stock-pile conveyor structure.

and one an excavator, make the Jaeger company 100 per cent P & H equipped. The shovel, a Model 400, ¾-cu. yd. dipper, is used to remove a 3-ft. layer of overburden from the deposit. One crane with a 1-cu. yd. clamshell bucket is assigned to stock-pile and truck-loading duty, and another machine, a Model 206 equipped with a Williams ¾-cu. yd. clamshell bucket, recovers sand and gravel from the pit, and dumps the material into a grizzly hopper which feeds the field-conveyor system.

The field conveyor system extends from the scalping screen to the position of the crane in the pit. A portable length, with a radius of 57 ft., extends from the tail pulley of the scalping-screen conveyor and can be shifted by the crane to follow its movement in the pit. A grizzly hopper equipped with a belt-conveyor feeder, driven by a 3-hp. motor, serves to feed the portable conveyor belt uniformly. The portable conveyor is equipped with a Goodyear 24-in. rubber belt mounted on an Atlas Engineering Co. undercarriage. From the portable conveyor the material discharges to the scalping-screen conveyor. The latter is 198 ft. in length and consists of a Goodyear 24-in. rubber belt traveling on Dodge idlers. The undercarriage is of wood construction.

As in most recently designed plants, the scalping screen and crusher with the return circuit conveyor are established as a unit near the tipple. This method eliminates a large circulating load from the tipple conveyor by screening out oversize material

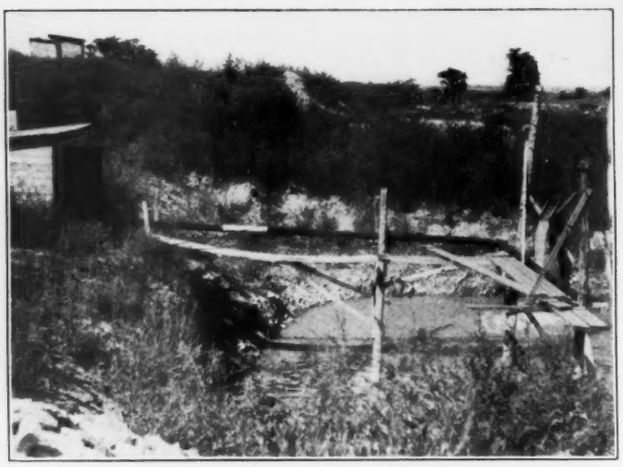
Shovel used for stripping and loading.

Clam-shell dumping into field hopper.

before it gets to the classifying and washing screens. At the Jaeger plant, a Toepfer 5-ft. rotary scalping screen having a 10-ft. section of 1½-in. mesh rejects oversize material into a hopper over an Allis-Chalmers No. 10 McCully crusher set at 1½ in. Crushed material is returned to the scalping screen on a 60-ft. belt conveyor equipped with a U. S. Rubber Co. 24-in. belt traveling on Dodge pulleys and idlers. Throughs from the scalping screen fall into a hopper lined with ⅛-in. steel plate which feeds the tipple conveyor. Motor sizes for the scalping and crushing machinery are as follows:

Scalping screen, American Electric, 25-hp.; crusher, Allis-Chalmers, 50-hp. with an 8-rope Texrope drive; return conveyor, American Electric, 5-hp. with open-gear drive.

Washing and classifying of materials takes place in a Toepfer 5-ft. rotary screen-and-scrubber located above the storage bins of the tipple. Materials reach it by means of a 24-in. belt conveyor 157 ft. long mounted on an Atlas Engineering Co. understructure. Dodge conveyor equipment is used with an Allis-Chalmers 15-hp. motor and Texrope drive. The Toepfer screen is equipped with a 6-ft. scrubber section, followed by 6 ft. of $\frac{5}{8}$-in. and 6 ft. of $1\frac{1}{2}$-in. perforated screen. A 5-ft. section of $\frac{3}{8}$-in., and a 12-in. section of $\frac{1}{2}$-in. perforated screen form a jacket to screen out pea gravel. Below the screen house are located three Link-Belt sand-settling tanks, of which one is used for masons' sand and the others for torpedo sand.



Well and pump-house. Settling pond in background.

The equipment for storing and handling finished materials is of especial interest. In addition to the truck-loading bins, an extensive stock-pile system is maintained for reserve supply and for winter delivery. The stock-piles serve also to prevent plant shutdowns during fluctuating shipping periods.

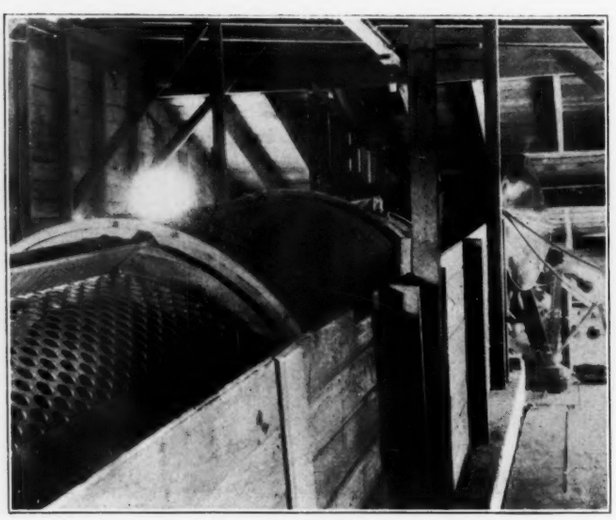
Run of conveyors as seen from the top of the screening building.

Since the plant caters entirely to truck delivery, the loading bin is designed for this service. Six sizes of materials are stored in the bins. These are masons' sand, torpedo sand, bank-run material for back-fill, pea gravel, 1-in. gravel, and 2-in. gravel. The compartments are of wooden construction on a steel framework and are supported by heavy columns permitting trucks to drive underneath.

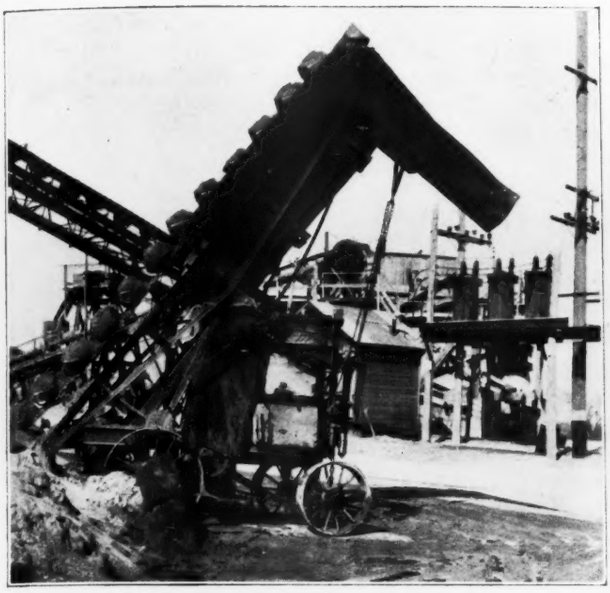
Trucks are loaded also from the west side of the structure, receiving the washed material from a loading chute installed on each compartment. A total of 450 cu. yd. of material is the rated capacity of the bins. Above the loading-bin structure is the washing and screenage equipment, completely housed for protection against the weather.

More than 60,000 cu. yd. of material can be stored in the stock-pile system—enough for five months' supply of material. The piles are made possible by a conveyor system extending from the truck-loading bin to a trestle which is equipped with a tripper to unload the materials to their respective piles. The first section of the system is installed parallel to the bin which receives material from loading chutes that are similar to the ones used on

Two of the three sand-settling cones.



Washing and classifying screen.



The electrically-driven portable loader.

Clam-shell crane loading delivery truck.

the opposite side for truck-loading. From the bin the conveyor is inclined to the trestle, where the second conveyor extends out 240 ft. over the stock-piles. The length of the first unit, including the inclined section, is 180 ft.

The undercarriage of the latter conveyor is supported on five steel towers spaced about 60 ft. apart. They resemble power-transmission-line towers. All steel work in the towers and the undercarriage was designed by the Boehck Machinery, Inc., of Milwaukee, Wis., and furnished by the Milwaukee Structural Steel Co. On both conveyors, U. S. Rubber Co. 20-in. belting, traveling on Dodge idlers and pulleys, is used; the first length, including the incline, is driven by a 20-hp. motor, and the horizontal-trestle length is driven by a 15-hp. motor. The tripper is a standard Link-Belt unit. An ingenious use of short lengths of chain that straddle the conveyor prevents the possible damage of the belt by the lashing of the wind. Besides being high in the air, exposed to the winds, the belt is raised from its idlers by the tripper which places it directly in the face of the wind. At intervals along the understructure bolts have been fastened, and a length of chain straddling the belt is held by a few turns of the bolt. When the conveyor is about to be used the chains are removed.

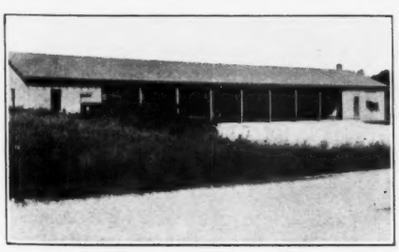
As previously mentioned, the Jaeger plant caters exclusively to truck shipment of materials. While much of the material is hauled by trucks under contract, Mr. Jaeger operates his own fleet as well. Five trucks—four Diamond T 3-ton capacity and one Sterling 4½-ton—make up the fleet. Heil steel bodies equipped with Heil hoists are used exclusively in the Jaeger fleet. Each body has a capacity of 4 cu. yd.

Stock-pile materials are loaded into the trucks by

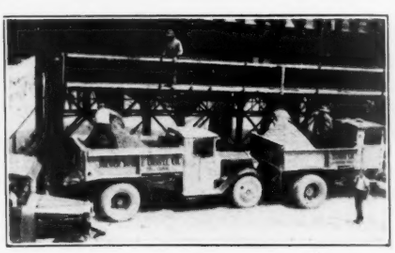
Fleet of delivery trucks at the plant.

a P & H Model 206 crane equipped with an Owen 1-cu. yd. clamshell bucket. The P & H shovel normally used for stripping overburden is pressed into stock-pile service when necessary. An Atlas Engineering Co. portable loader also is used to load trucks. This machine is electric-motor driven.

An Allis-Chalmers 5-in. by 4-in. centrifugal pump, driven by a 40-hp. motor, delivers 750 gal. of water per min., at a pressure of 55 lb., to the



Office building and car stalls.



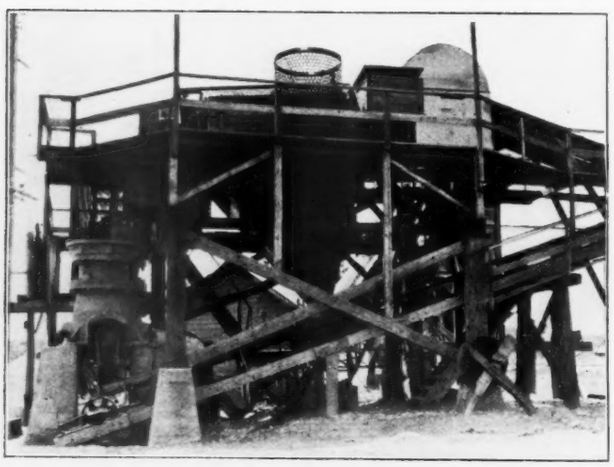
Trucks loading at the bins.

Stripping shovel at stock-piles.

Henry Jaeger, president and manager.

Wm. Frentz, vice-president-treasurer.

fresh-water pipe-line leading to the washing screen. A clarifying system permits the waste to settle from the wash-water in an upper pond, with the overflow of clear water trickling to a lower pond that is an open well. The Allis-Chalmers pump is mounted



The scalping screen and crushing unit.

in a frame pump-house at the bank of the latter pond.

No plant, no matter how excellently it is equipped mechanically, is complete without an adequate office building and facilities for the comfort of its employees. At the Jaeger plant, a concrete-block building houses an eight-car garage, the clerk's office, Mr. Jaeger's private office and (on the opposite end) a tool shop. The office and garage entrances front County Highway FF, while the east end of the building faces the company road to the plant. The building is about eight feet higher than the county road. This difference in levels afforded an entrance from the company road into the building basement and the company made use of it by providing a comfortable rest room for its employees.

All employees are experienced men. Year-around employment, made possible by shorter hours during the winter season, has eliminated seasonal floaters. The most recently employed man has now been with the company for two years.

How Crushed-Stone Producers Save

(*Continued from Page 43*)

point I realize it might seem to mean a difficult undertaking.

Insurance companies deal in averages; they don't know how long I will live, but they know how long the average man of forty-eight will live; they can guess almost to a day when the average man of forty-eight will die. It is a little gruesome and disturbing, this sort of thing, to think about; but they are forced to deal in averages.

I am aware of what the companies are doing so that insurance may be extended and become profitable; I believe, as that occurs more and more, the insurance carriers will find an answer to it, and what he suggests might be the local answer, something to throw them off the present trend in order to reflect more readily and quickly to the company that is preventing the accidents its proper share, and not entail this company paying for the company that is not preventing accidents.

As for what we have done in that length of time, aside from the financial phase of it, one of our plants operated eighteen months without lost time through injury; another twenty-eight months without any lost time; in 1929 we placed two quarries among the first six in the National Crushed Stone competition, and in the open competition sponsored by the Bureau of Mines for all mining operations, we placed one sixth and one sixteenth. That would not be a record of which a cement company would be proud, but it is in the first two and a half years that we have undertaken any accident prevention.

Sand-Lime Brick Manufacture Down 14 Per Cent in Canada

Production from the sand-lime brick industry in Canada during 1929 was valued at $953,726, a decline of 14 per cent from the record established in the previous year at $1,112,466, but 15 per cent higher than the average reported for the five-year period, 1924-1929. Output of sand-lime brick during the year under review amounted to 78,361,000 brick worth $953,726 as against a total of 82,271,000 brick valued at $1,038,510 in 1928 when the balance of the output consisted of hollow building blocks.

In 1929 a total of 12 plants were operating in Canada, 7 of which were located in Ontario, 2 in Quebec, 2 in Manitoba, and 1 in Alberta. These concerns employed a capital of $2,356,726 and distributed $341,005 in salaries and wages to a monthly average of 304 employees. Purchased materials cost $264,465 and the value added by manufacturing processes was $689,261.

Mechanical Processes Used Throughout New German Limestone Plant*

By PAUL LUDOWIGS

AFTER the limestone crushing and screening plant, built in the year 1922 at our Schlupkothen operations near Wuelfrath, had, in spite of later extensions, been utilized to the limit of its capacity, we saw ourselves forced in the year 1928-29 to convert our Flandersbach plant likewise to mechanical methods of winning and preparing the stone.

Experience had established not only that the mechanization of the quarry operation resulted in an appreciable lowering of costs, but also that the blast-furnace plants, as purchasers of our limestone products, gave so much preference to the stone prepared by machine and sorted according to size that the marketing of the stone quarried by hand was becoming steadily more difficult. Furthermore, the mechanization and the accompanying increase in capacity of the Flandersbach operation gave the advantage of concentrating, onto the most favorable quarry, the stone quarrying that had been distributed among several adjoining pits.

While at Schlupkothen we had built two identical installations with large-roll crushers and rotary screens, in order not to be obliged to shut down entirely in case of interruptions, we proceeded at Flandersbach on the principle of installing only one unit of equipment for each normal operation, but specifying a particularly strong construction throughout so as to confine interruptions in operation and shut-downs for repairs to the smallest amount possible. There is no doubt that the availability of reserve units is of inestimable value in case of interruptions. On the other hand, the cost of mechanizing the stone-quarry operation comes so high that one must impose on himself a strict limitation in the number and types of the necessary machines if it is desired to avoid an excessive initial loading of the fixed costs through interest and amortization of the invested capital.

For the stone quarry there are available at Flandersbach, on each of two levels, two electric shovels with 3 1/3-cu. meter (about 4½-cu. yd.) dippers, which load the stone, loosened by chamber blasting, into cars of 25-ton capacity. Steam locomotives haul the cars, loaded with blocks up to more than 1-cu. m. size, to skip-hoist loading stations erected for each level. Here the cars are emptied, by means of a car-dumper, that can be tipped through 60 degrees, into the hoisting skip, also of 25-ton capacity.

The subsequent steps in the operation of the plant can be seen from the accompanying diagram, and the following supplementary remarks can therefore be confined to the notable features of the principal machines and the installation as a whole, as well as innovations which are only slightly known in the lime industry.

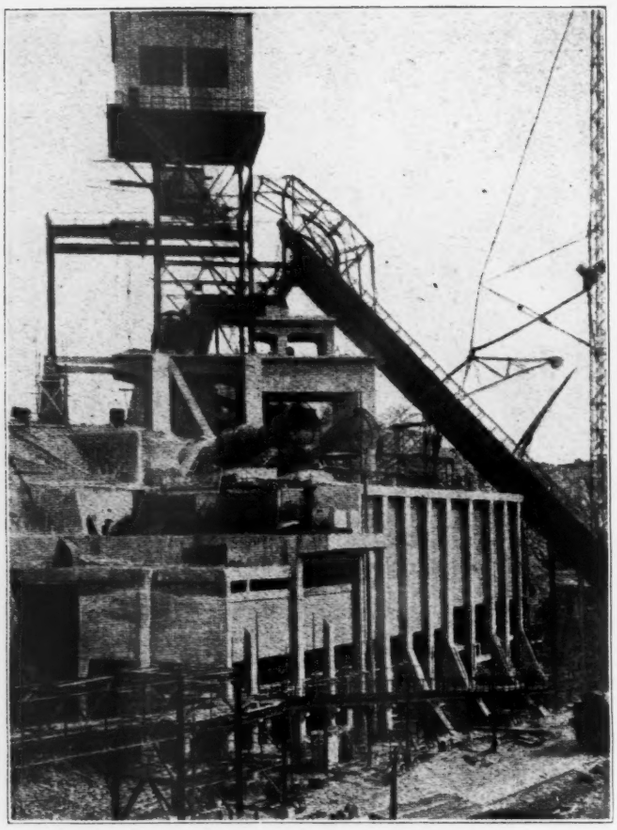
This article describes the new quarrying, crushing, screening and washing plant of the Rheinische Kalksteinwerke G.m.b.H. of Wuelfrath, Germany, and is of particular interest to American readers not only because it describes the solution of a specific problem for the winning and preparing of crushed limestone, but also because it chronicles the first adoption in Germany of several practices that are well known in this country. These are the use of Ward-Leonard control for one of the large electric shovels, the live-roll grizzly for sizing stone, and the vibrating screen for the finer material. The article was written by the company's engineer and has been translated from the German by a member of PIT AND QUARRY'S *staff.*

The inclined skip-hoist is worthy of note because of its unusual size, its Leonard-Ward control, and its almost entirely automatic operation. In twenty trips per hour, the hoist carries 500 tons of stone to the crushing plant, up a track inclined at 45 deg., and 45 m. and 95 m. respectively, from the two loading stations.

Stone discharged from the skip-hoist is carried to the jaw crusher at a uniform rate by a powerful feeder. The crusher, weighing 176 tons, with a maximum jaw opening of 1,800 by 1,400 millimeters (72 in. by 56 in.) and a minimum discharge opening of 250 to 280 millimeters (10 to 11.2 in.), handles, with ease, the hourly capacity of 400 to 500 tons of limestone in blocks often larger than 1 cu. m. that is required of it.

The difficult question of the sizing of the broken stone with the most careful handling, particularly of the kiln stone, was solved by using a roll grizzly for the screening of the material under 130 millimeters (5.2 in.) and, for the sizing of the oversize—over 130 millimeters—into stone for shaft and annular kilns, a traveling bar-type grizzly, Ross system. While the latter is an already proved apparatus for coarse sizing, the live-roll grizzly is an innovation, not previously used in Europe, which, in our operation, has established, in every respect, the proof of its utility. This grizzly, 2 m. wide and 4.5 m. long, consists of a system of rollers of 450 millimeters (18 in.) diameter, inclined at 20 deg. and revolving in the direction of inclination. The rollers are so profiled and proportioned that, between the individual rows of rollers, are formed almost quadrangular screening surfaces corresponding to

*Translated from *Tonindustrie-Zeitung* 54:699-702, May 26, 1930.

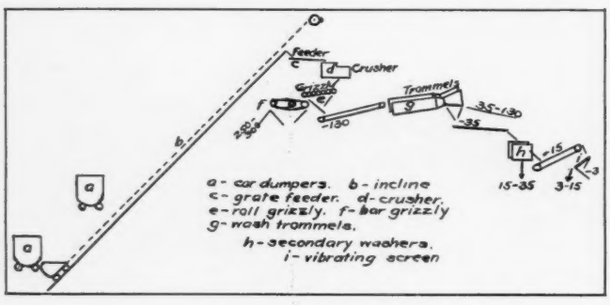


View of the plant during construction.

the various sizes of materials to be produced.

The characteristic of the operation of the roll grizzly is that each successive roller shaft in the direction of the flow of material revolves faster than the preceding shaft, so that the last rollers rotate almost twice as fast as the first shaft at the feed end. In this way, the stones cannot clog in the sizing openings between the rollers, but are always lifted and carried on by the faster rotating roller. The machine occupies unusually small space, gives large capacity along with careful handling of the stone, and has a small requirement of power. It makes possible an excellent sizing. In America these grizzlies have had a wide use in the stone industry for some time.

While at Schlupkothen we wash only the stone under 35 millimeters (1.4 in.), we have adopted at Flandersbach the practice of giving all material under 130 millimeters (5.2 in.) a thorough cleansing. The two large washing trommels, 12.5 m. long including the screening cone and 2.5 m. in diameter, each with a capacity of 125 tons per hour, are mounted at an incline and work on the countercurrent principle. The limestone of 0 to 130 millimeters is fed into the lower end of the trommel, and the fresh water is added at the trommel discharge end. During their passage through the inclined trommel, provided with spiral blades, the stones must thus pass the stream of fresh water before they reach the conical screen at the discharge end of the barrel. Along the length of the screening cone a powerful jet again plays on the 35- to 130-millimeter material, guaranteeing a perfect cleansing of this material.



Flow of material at the plant.

The material under 35 millimeters (1.4 in.) separated by the washing trommel is subjected to another thorough washing in Excelsior "sword washers" and stage washers which divide this material into sizes of 0 to 15 millimeters (0 to 0.6 in.) and 15 to 35 millimeters (0.6 to 1.4 in.).

Another rarity for German limestone operations, in addition to the roll grizzly, is the use of the vibrating screen, although the utility of this screening mechanism has long been demonstrated in America. The advantages of this screen over other screening devices lie in the small space requirement, low installation costs and highest capacity with very low requirement of power.

The economical and dependable rubber-belt conveyor was used wherever available for the means of conveyance between the individual processing machines.

The completed crushing, washing and screening plant.

The necessary fresh water for the stone washery, about 6 cu. m. per minute, is furnished by a 100-hp. vertical pump from the water reservoir of the stone quarry. The dirty water coming out of the washery is removed by means of an armored sand pump to a settling basin, some distance away, whence, after a cleansing by settlement, it flows back.

The concrete loading bins, which support a part of the washing and screening equipment, have a total capacity of 4,700 tons. Worthy of mention here, in addition to the horizontal shaping of the bin bottoms to prevent wear, is the reinforcing of the side walls of the bins for kiln size and coarse

(*Continued on Page 56*)

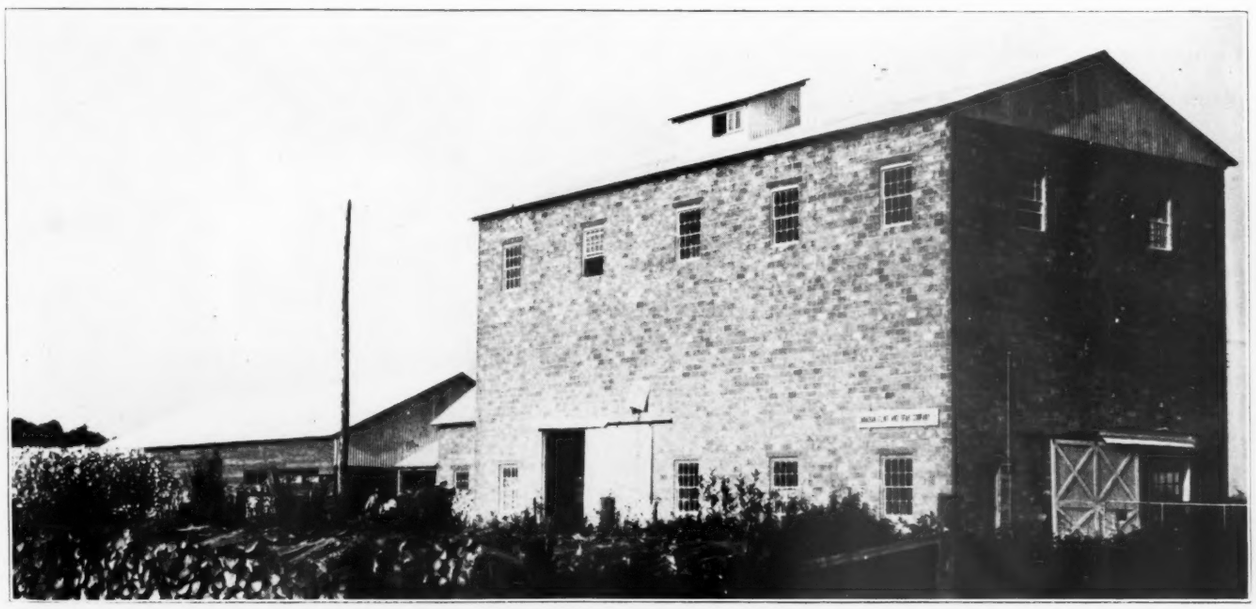
The storage building and open storage piles in the yard.

Canadian Feldspar Plant Supplies Raw Material to Ceramic Industries

Rich Deposit in Buckingham District of Quebec Now Mined by Underground Method

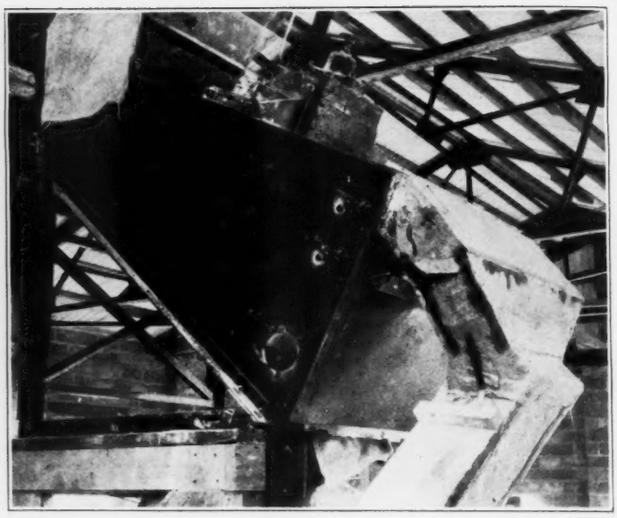
SINCE 1920 most of the feldspar produced in Canada has come from the Buckingham district immediately northeast of Ottawa, Ont., in the province of Quebec. A number of mines in this vicinity produced some of the highest grade feldspar known to the industry. These feldspars vary from pure white to cream in color and have unusually high-potash and low-soda contents. Shipments have been made principally to the mills at Rochester, N. Y., for use in the ceramic industries.

During the World War the pottery industry in the United States enjoyed considerable expansion which led to an increased demand for feldspar. This encouraged prospecting and, as a result, most



Plant from southwest. Storage building and part of yard storage at left.

Conical mill and air-separator elevator. Dust collector at right.



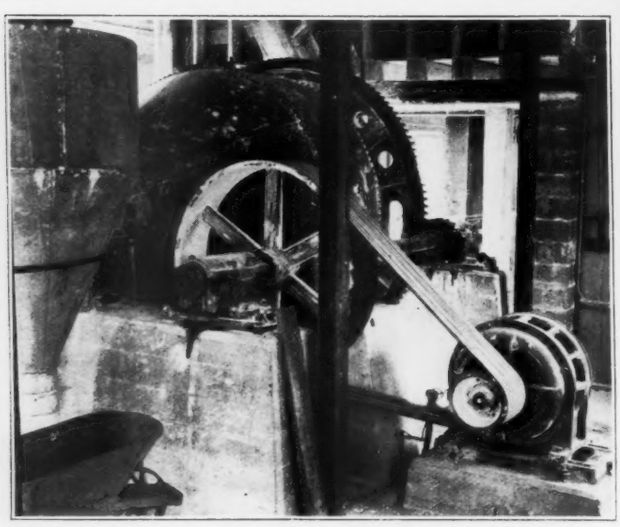
The electric vibrating screen and chute are completely inclosed.

of the pre-Cambrian areas of Ontario and Quebec were investigated. Numerous new mines were opened during this period but only a few of them proved profitable. The remainder shut down after short periods due to the poor grade of the mineral, the small extent of the deposits, or the high freight rates.

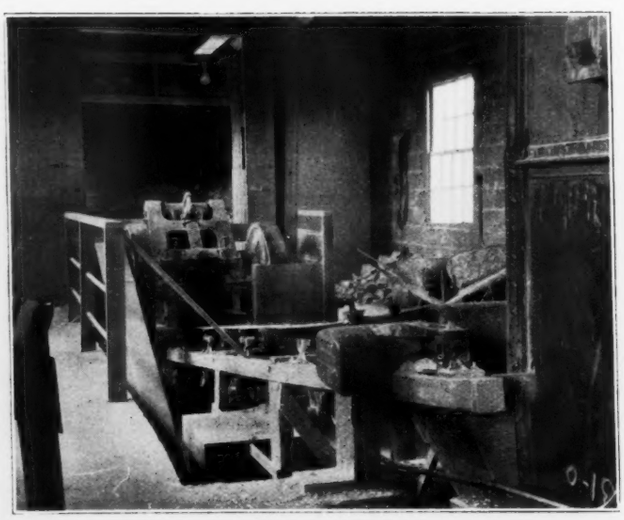
In the fall of 1920 one of the largest and purest bodies of feldspar known on the continent was discovered in the hills above the Lievre River, about nine miles north of Buckingham, Que. This deposit is part of a large intrusive mass of pegmatite with intergrowths of individual crystals 20 to 40 ft. long and up to 15 ft. in diameter. Quartz is present in very subordinate amount, tests showing only 1.5 per cent.

This deposit is owned by O'Brien & Fowles, Ltd. and is being operated by the Feldspar Quarries, Ltd. It is known as the Derry mine and furnishes part of the spar for the new processing plant owned by the Canadian Flint & Spar Co. at Buckingham which went into operation early in 1930. The greater part of the output, however, is exported to mills at Rochester, N. Y., operated by the Consolidated Feldspar Corp. The Derry mine was originally operated as an open quarry but is now operated underground to a depth of 190 ft.

Drilling is done with jackhammers and enough holes are fired at one time to produce several hundred tons of broken rock of one-man size and smaller. The spar is loaded by hand onto dump cars which are hauled by a one-car skipway to the surface. There they are dumped over a bar grizzly, the oversize going to a bin from which the spar is drawn in order to sort out the waste. The pure spar then goes to another bin for shipment.



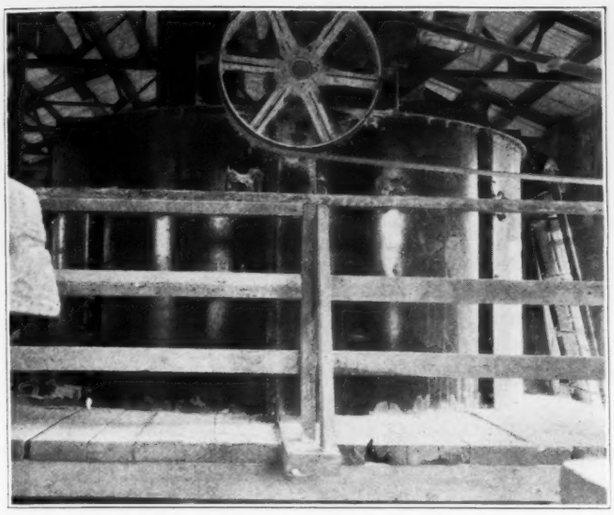
Another view of the conical mill showing multiple v-belt drive.



The jaw crusher which reduces the material to ½-in. or less.

The material passing through the grizzly goes to a stock-pile from which it is fed to a trommel with sprays which wash out sand and fragments less than ½-in. in size. This material then goes to a white-surface picker belt where impurities are removed. The pure spar proceeds to a second bin. Both storage bins discharge either to trucks which haul to the plant or to railroad cars for export shipment.

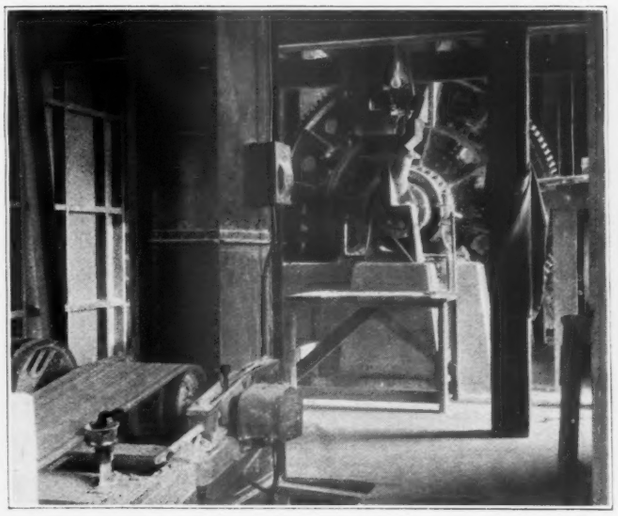
Canadian Flint & Spar Co. operates another and nearby mine which is purely an open-pit operation and has been operated only in the winter because of the lack of a suitable summer road. This deposit is about half feldspar and half quartz, segregated in large masses. These are separated by hand and hauled away in sleds to the mill at Buckingham. There is a ready local market for the quartz, part going to the Electric Reduction Co. as a flux in the extraction of phosphorus from pebble phosphate



Upper portion of the air-separator which handles pottery spar.

and part to the grinding mill for the preparation of pottery flint.

The new plant at Buckingham was designed by and built under the supervision of Norman B. Davis, managing director of the company. It has a capacity of from 1½ to 4 tons per hour of finished spar depending on the size being produced. The building is of cinder-block construction with reinforced pilasters and concrete floor and foundations. It was designed to allow ample space for future expansion.

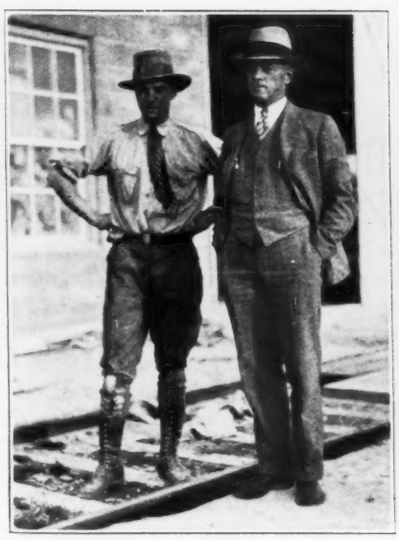


Magnetic pulley on conveyor (left), and the 8-ft. conical mill and feeder in rear.

The trucks from the mines discharge into a large wood-frame dry-storage building with sufficient capacity to allow operations to be continued throughout the winter. The spar is taken in wheelbarrows to a Reliance 10-in. by 18-in. jaw crusher which reduces to ½-in. and under. This discharges onto a short 16-in. slightly inclined belt conveyor with a Dings 12-in. by 18-in. magnetic head-pulley to remove any small tramp-iron. The man feeding the crusher also watches for iron at that point.

The conveyor discharges to the boot of a bucket elevator on 38-ft. centers which discharges into a 40-ton-capacity timber storage bin. A Hardinge 14-in. constant-weight feeder delivers from the bin to the Hardinge 8-ft. conical mill which has a 36-in. horizontal drum section. The mill is lined with flint blocks and uses flint pebbles as grinding media. These pebbles are added in sizes of 3-in. to 4-in. in diameter.

The Hardinge mill discharges to the boot of a bucket elevator on 46-ft. centers which discharges



Supt. Leo McDonnell and Norman B. Davis, general manager.

Loading operations in the Derry feldspar mine. The car is hauled by skipway to the surface.

Car at foot of incline in Derry mine.

to a chute which has two connections at the top of the building. One chute for pottery spar feeds a Sturtevant 10-ft. air separator. The oversize from this goes by gravity to the feed end of the Hardinge mill. The finished material drops to a chute whence it is either bagged or wheeled in barrows into railroad cars.

The second chute from the elevator is for glass spar and discharges to a Hum-mer double-deck vibrating screen which is fitted with wire-screen cloth of from 20- to 40-mesh as required. The coarse spar from the screen goes by gravity back into the Hardinge mill while the fines go by gravity into railroad cars for shipment. A dust collector takes the dust from the oversize chutes to the mill and from the feed and discharge ends of the mill. This collector uses a No. 3 Sturtevant fan and produces 325-mesh material which is bagged separately and sold for special purposes.

The Hardinge mill is driven through a Texrope drive by a 60-hp. motor. The Sturtevant air-separator and fan are belt-driven by 10-hp. and 2-hp. motors, respectively. The Reliance jaw crusher is belt-driven by a 20-hp. motor and, in turn, drives a line-shaft from which the conveyor is driven by a belt and the elevator by a chain.

This plant is the largest and most modern of its kind in Canada and was built to satisfy Canadian demands. The product, because of its high-potash content, is especially suited to the manufacture of porcelain for high-tension insulators, enamels and for use in the manufacture of glass. The following is a typical analysis.

Silica	65.74 per cent
Alumina	18.88 per cent
Iron	0.05 per cent
CaO	0.08 per cent
MgO	0.10 per cent
Na_2O	2.75 per cent
K_2O	12.34 per cent
Total	99.94 per cent

A small plant, previously operated in Ottawa, produced stucco for building purposes. Pink, buff and red spars are preferred for this market. This plant's equipment is being moved to Buckingham and will be installed in the main plant building.

New German Limestone Plant

(*Continued from Page 52*)

stone with strong plate. The finished stone products are loaded from the bins into state railway cars, principally large-capacity material cars.

Weighing and switching of the railroad cars is controlled from the operating platform for the bin-gates, which are hand-operated for the fine and medium materials, but electrically-driven for the kiln stone. In order to free the kiln stone from the splinters which cannot be avoided in the fall into the bin, this material passes over grates between the gate and the loading chutes, and belt conveyors under the grates carry the material that passes the grates to the washing and screening equipment for fine material. The stones selected for shaft-kiln purposes are conveyed by means of a 600-m. chain conveyor, along with the fuel, to the top of the eight shaft kilns.

Electric motors are used throughout for the drives. The electric current is received at a tension of 10,000 volts and is stepped down in a private transformer station to 500 volts for power and 220 volts for lights. The connected rating of the whole new plant, including the four electric shovels, amounts to about 1,900 kw.

The equipping of an excavator with Leonard-Ward control is also worthy of note in this connection. While, in America, most electric shovels over 2-cu. m. bucket capacity have been equipped with this control for a long time, this is the first shovel to be so constructed in Germany. Aside from a greater economy of current, there is a higher capacity and a smoother operation of the machine, in contrast to former designs, that can not be ignored. Furthermore, the use of the stronger and larger quarry shovels, which have to dig hard stone in large blocks, has shown itself, up to the present, to be of great advantage.

In the design and construction of the plant special emphasis was placed on the selection of appropriate and powerful machines for the severe requirements in handling a hard and coarse limestone and thus to limit repairs and interruptions to the smallest amount possible. Appropriate arrangement of the various machines saved much long and expensive conveying and made possible an efficient and safe operation of the plant with few men.

Speed Regulation of Rotary Kilns in German Portland-Cement Plants*

Factors Involved in the Determination of the Most Economical Type of Motor

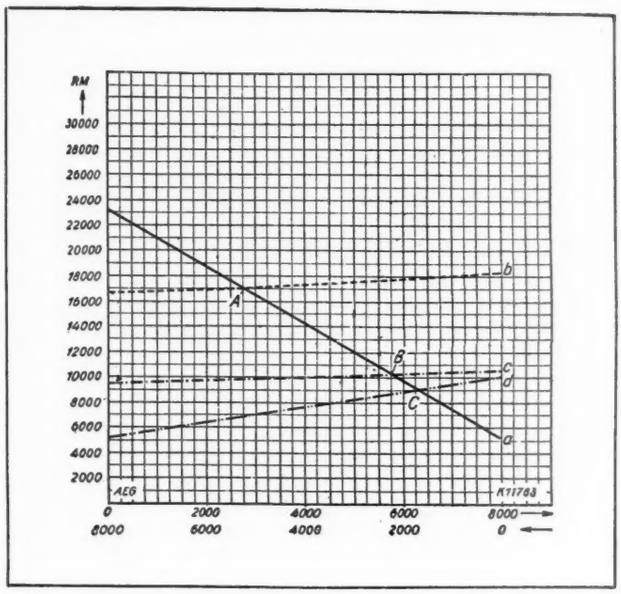
By ERICH AUERBACH

THE slow rotation of the rotary kilns in cement plants is in practice accomplished through conversion of the r.p.m. of a standard high-speed electric motor by means of special reduction gearing. Almost all cement plants require, however, that, for the production of good clinker, the peripheral speed be capable of reduction varying to about half of the full r.p.m. For meeting this requirement the man in charge of the selection of motors has at his disposal under the present status of the electrical industry four different possibilities. (It can be assumed in this connection that 3-phase current of moderate tension, e.g. 500 volts, as is usual everywhere today, is available in the plant circuit.)

There is, first, the ordinary a.c. motor with regulating slip-ring and fixed brushes. Here the speed is regulated by switching in resistances in the circuit of the rotating part, the armature, mostly by means of drum starters. In this the turning moment, as is desired, remains constant. The only, but also a very serious, disadvantage of this procedure is that at half speed, for instance, the same kw. capacity is required as with full speed, although mechanically only half is made available for useful work. The rest is lost in the regulating resistances or is converted into heat losses.

Then, for regulation practically without loss, there are the d.c. shunt-wound motor and the a.c. commutator motor. But, in the first case, the direct current itself must be generated, that is, be produced from the available alternating current. This requires the installation of a special generator; this is nevertheless justified if several kilns are concerned and if other variable-speed motors are required, as in the waste-heat process, for example, for the fans required, or perhaps for the raw feed and the preparation of coal. In such cases, of course, one large generator can provide the whole direct-current capacity, rather than individual generator sets for each of the d.c. motors.

In the a.c. commutator motor the speed is changed by means of a shifting of the brushes. In spite of the not unfavorable economic results with this type of motor it should be remembered that the collector of a motor of this kind can not be effectively protected against cement dust, while the slip-ring equipment of the ordinary a.c. motor, with reasonable attention, will not be attacked by the dust.



Total operating costs for three a.c. slip-ring motors (a), compared with three d.c. shunt-wound motors with a generator (b), three a.c. commutator motors (c) and three two-speed motors (d).

While in the three types of motors considered thus far, a regulation of speed is possible in a continuous graduation, there is still a fourth type, in which in addition to the full speed only, a half speed can be obtained (that is, no intermediate stages); this, however, should be adequate for many operating conditions. This is the a.c. motor with adjustable pole connection which, by simply changing its winding, can be converted into another motor of half its capacity, so to speak.

If we now ask ourselves which motor is most to be recommended for given operating conditions, we can determine this on the basis of a calculation of productivity, if the average yearly number of hours of operation for the various peripheral speeds of the kiln can be ascertained exactly. For comparison, one needs above all to know the efficiencies of the motors to be taken into consideration, from which the loss in kw. can be calculated. Thus, for example, in an a.c. slip-ring motor of 45 hp. or 33 kw. there will be given, from an efficiency of 89 per cent, a current consumption of 37.1 kw. or a loss of 37.1 kw. — 33 kw., or 4.1 kw. The amount corresponding to useful capacity can be neglected throughout in the comparison, since its result is the same for all types; only the excess over consumption (the loss) can yield a decision.

When the losses have been calculated for each operating speed to be investigated, then one multiplies them separately by the respective number

* Translated from *Tonindustrie-Zeitung* 54:635-637, May 12, 1930.

of hours of operation and adds the products to determine the yearly loss of kw.-hr. for the motor concerned, the price of which will then be the determining factor. Then a calculation of the amount for interest and amortization on the installation costs of the different types of motors must be made.

Let us assume that the total yearly hours of operation be always 8,000. We indicate the number of operating hours during which the kiln operates at full speed n by Bn; then in consequence the remaining hours of operation at partial speed, as at 0.5 n and 0.75 n, is 8,000 — Bn. To orientate ourselves we now draw up a graph on which we enter the costs for the different types of motors in relation to Bn for the whole range from 0 to 8,000. The composition of these costs is found as follows. First the capital charges K. They are, if

p = interest in per cent
q = amortization in per cent, and
A = invested capital,

then, $K = \left(\frac{p+q}{100}\right)A.$

Further:

Vn = kw. loss at full-speed operation,
Vt = kw. loss at partial-speed operation
e = price per kw.-hr.

After this, for the ordinate value of our curve the cost can be determined from

$$K + [Vn - Bn + Vt\ (8{,}000 - Bn)] - e$$

The occasional intersecting points of these lines for the individual types of motors indicate the limits from which, with increasing Bn the one, with decreasing Bn the other, motor becomes more economical. On the basis of numerous investigations of the Allgemeine Elektrizitaetsgesellschaft it was ascertained (see the accompanying graph) that the d.c. motor with generator set gives most favorable results only when operation during a large part of the year is at reduced speed. But if the yearly number of hours of operation for full normal speed grows so great that this operation predominates, then, in spite of the loss of power in the regulating resistances of the a.c. slip-ring motor, this motor shows the lowest total costs, while its installation cost is also by far the lowest.

So far as the third and fourth types, commutator and two-speed motors, are concerned, the viewpoints previously expressed hold good; that is, their selection will not often be decided on, even if the curves, especially for the less frequent partial speed operations, show very good economy.

Judicious Spending of Highway Dollar Is Aiding Unemployment

How much of the highway dollar goes to labor?

According to the calculations of Fred R. White, chief engineer of the Iowa Highway Commission, more than half of the money spent on hard surfaced road building goes directly to workmen.

During the last few weeks there has been considerable talk about the relief of the unemployment situation through extended road building activities. The Federal Government has speeded up the allotment of Federal-Aid funds, making some $122,000,000 immediately available. But as yet only few states have made definite attempts to cooperate and still fewer have broadened road activities.

Road building as an outlet for unemployed men is not idle talk, nor is it theory. Considering the average paving job a force of from 40 to 60 men is needed, depending on the locality, for each paving outfit. In addition, considerable labor is needed for grading and bridge building. For laying a mile of pavement these men, together with the men who make the cement, handle the aggregate, make the reinforcing steel, do the freight handling, receive 52.34 per cent of the cost of the pavement. But calling to mind the men employed in making road machinery, labor actually receives considerably more.

From this it is readily seen that pavement building benefits workmen far afield from roads. It so happens that this country, with little more than 100,000 miles of roads, hard surfaced to the point of lowest car operating costs and lowest upkeep costs, is greatly in need of more pavements. Economists agree that whatever suffering is occurring to communities is not that of lack of resources or of money, but rather the lack of consumptive power on the part of workmen. Because of the dire need for pavements, communities can both reëstablish effective distribution of currency and equip themselves with much needed motoring facilities.

Taking into consideration the actual cash value of hard-surfaced pavements, which save from one to two and one-half cents per mile in car operating costs over less stable surfaces, and the lessened upkeep costs on the road itself, it is good business for communities to expand their pavement building as an economy measure as well as a social.

The outlay required for needed pavements, both city and rural, is frequently more than current income. Numberless communities, realizing they can build pavements that will long outlast the bonds, are adopting the bond issue method. Current motor-vehicle tax returns easily pay the costs and no extra taxation is usually necessary.

The problem now is to make money immediately available for pavement construction. Some communities are slashing red tape to do it.

Cement Used by Romans not Produced by Burning Process

Contrary to a popular idea, the ancients do not seem to have been acquainted with Portland cement, of the kind now universally used. The cement used by the Romans was not a burned product. It was made from powdered volcanic ash and slacked lime, which were mixed together and called pozzuolana. It had many of the elements, however, of the present Portland cement.

New York Crushed-Stone Men Optimistic Over 1931 Business Outlook

Annual Meeting Held Dec. 12; Bond Law Proposal Put Before Senate Committee

OPTIMISM about the business outlook for 1931 was the keynote of the annual meeting of the New York State Crushed Stone Assn., which convened at 10 a. m. December 12, at the Hotel Pennsylvania, New York. President John Odenbach occupied the chair, A. S. Owens being secretary.

The principal business of the meeting was to ascertain the sense of the association and particularly of the thirteen members present regarding the proposed bond law to protect material men and laborers against losses sustained through contracts on state highway construction. The meeting was unanimously favorable to such legislation.

John Rice, of the General Crushed Stone Co., was appointed to speak on this subject to the Senate Committee which sat during the afternoon in the chambers of the New York Bar Assn. at 42 West 44th St., New York, to consider the lien law.

Mr. Rice forcefully presented the case for the material men, in substance. He pointed out that the association represented investments aggregating more than fifty million dollars, employed a large number of men, and favored such a law because it is the best proposal thus far submitted for the protection of the interests of the state, labor and the material and construction industries. He pointed out that legislation of this character was in force in 38 states at present, and that this legislation, if enacted in New York, would necessarily raise the standard of all contractors and speed up public construction which, in the absence of such a law, is necessarily delayed by reason of refusal of the material interests to supply material to contractors in arrears.

He pointed out that this legislation could be made to cover sub-contractors, that the increased cost of such bonds would be relatively little as compared with the benefits to the material men through smaller credit losses to day laborers who are seldom able to file liens under the present costly legal machinery now available to them, and that there would be a large intangible saving to the citizens of the state by virtue of the more speedy completion of the work. He pointed out that the Empire State Sand & Gravel Assn. had passed a resolution at its last meeting favoring such legislation and had submitted a telegram from the slag interests at Buffalo registering their approval. Mr. Marsh, president of the Empire State Sand & Gravel Assn., then spoke briefly along the lines followed by Mr. Rice.

Mr. Hayes, secretary of the Associated General Contractors, New York Highway Chapter, then offered an amendment to the highway law, apparently as a substitute for a bonding law. The substance of this proposed amendment was that the superintendent of public works should, before certifying any work, require the contractor to show, by affidavit, the number of laborers on each job during the period covered by the payment to be made and the amount so paid; and providing that, if the laborers were not all paid, he retain an amount sufficient to take care of the labor claims, such claims to be adjudicated by him at Albany within five days from the time of receiving such affidavit. Royal Fuller, of Albany, jumped to his feet and characterized the amendment as asinine. He said it was just a gesture, offered no protection to the material man, and was worthless to the day laborer who would find it just as impractical to go to Albany as he now finds it to go to court. The Superintendent of Public Works would become, in effect, a justice court and would be so occupied in adjudicating disputed claims that he would have little time to perform the proper functions of his office.

Mr. Odenbach, speaking in behalf of the bonding law, said that, last year, their losses had been about 2½ per cent, whereas, this year, they had reached almost 5 per cent as a result of defaulting contractors. He cited the difficulty of checking the contractors from a credit viewpoint under the present rapid construction methods. In one case he mentioned, his company had supplied $18,000 worth of material for one road job in a period of 19 days and, in another case, he showed that a road had been held up four months as a result of a financially weak contractor who failed to carry on.

The following officers of the association were elected for the year 1931: President, A. S. Owens of the Eastern Rock Products, Inc., Utica; vice-president, J. Russell of the Jointa Lime Co., Glens Falls; secretary, George Schaefer, western district manager of the General Crushed Stone Co.

Arrangements have been made for special sleepers and a club car to leave Albany via Buffalo and Cleveland on Saturday at noon preceding the meeting of the National Crushed Stone Assn. at St. Louis, Mo. A large attendance of members of the state association is indicated and it was decided that the next meeting be held in St. Louis, at the call of the president, between the following Monday and Thursday. This will probably take the form of a dinner meeting.

A touch of humor was added to the afternoon meeting before the Senate Committee by F. I. Ginsburg of New York City who furnishes equipment to contractors. His wail was that very little equipment is sold for cash; that, on the partial-payment basis, when the contractor falls down and the ma-

chinery must be replevined, the small cash payment does not pay for the incidental wear and tear of two months' use plus the legal costs; and that the renting method is far more hazardous than the term sale as there is absolutely no protection. In the one case you go out, hold a sheriff's sale and buy the machinery in; in the other case, you just go out, drag your machinery home and do your crying en route! He characterized the people in his business as an easy-going lot of "slobs" who have never asked nor received any protection, and he thought that it is about time something is done in this regard.

He was accorded the only applause of the afternoon, but probably little sympathy!

Great Britain Provides Good Market for Talc Production

The north of England has, for years, provided a steady outlet for talc or French chalk, most of the supplies coming from the Continent. Regular imports are received from Italy, France, Norway, and Spain, and restricted shipments from Canada, according to the *Commercial Intelligence Journal,* Ottawa, Ont. Most of the few large importers are located in Liverpool and Manchester, close to the Lancashire textile industry, which was one of the original large consumers of this commodity.

Italian talc, handled largely by one Liverpool firm, is recognized as the finest on the market on account of its soft, soapy texture, and its sheen, weight and wide range of shades, from bluish grey to pure white. Its uses are various—the finest quality is in demand for finishing laces, high-grade textiles and paper, and in certain perfumery processes, while the medium and lower grades are used in the dry soap, rubber fabric, asbestos and paint industries, and small quantities for candy dusting and rice polishing.

French and Italian talc comprises the major portion of the imports of this market. The French talc is in good demand for a medium grade; it lacks the luster of the Italian product, has a flat white color and is perhaps a little heavier than the Canadian, which it closely resembles in other respects. It is used in the tire, low-grade textile, and paint industries.

After being off the English market for a number of years, Norwegian talc is now being shipped in increasing quantities. Although it is a coarse, hard talc, full of impurities, it is attractive to certain buyers on account of low price. Considerable quantities are used by roof-felting manufacturers, the rope and twine trade, a few rubber manufacturers, manufacturers of asbestos sheeting, and others to whom price is more important than quality.

Spanish talc is not imported in large quantities. It is a good white but supplies are irregular. The Manchurian talc has been tentatively tried; it has good color and texture but is unsuitable for textile trade on account of ferric impurities. Distance and irregularity of supply have also added to the difficulty of introducing it in England.

The Canadian product is considered a good medium-grade talc and finds a limited market in the textile trade on account of its excellent color. However it lacks the luster of the Italian, is not so soapy, and is light and fluffy compared with the Continental talcs.

Due to the existing depression in textile trades, importers are looking more to the rubber industry as a consumer of talc. Other outlets are in pottery finishing, paper sizing, cosmetics, and rope and twine finishing.

Manufacture of Haydite Aggregates for Concrete Explained

Much has been published regarding the properties of Haydite, the light-weight aggregate for use in concrete, but the following brief description given in the October issue of *The Excavating Engineer* (Bucyrus-Erie Co.) will probably prove of interest to readers who are wondering how this aggregate is manufactured. This excerpt is from an article concerning the plants of Western Brick Co. at Danville, Ill.

"Concrete made with Western Haydite aggregates, which comes in the sizes in which natural aggregates are prepared, weighs 33 to 40 per cent less than ordinary concrete, with the same strength. It has similar advantages to the units.

"Other features claimed for Haydite units and concrete are non-corroding of reinforcing steel and other metals, nails can be driven into it and hold securely, units can be cut or channeled without breakage, elimination of lath—plaster and stucco may be applied directly to the Haydite units or wall. The weight-saving feature is naturally of outstanding advantage in construction of the modern skyscraper, where saving in dead load is of primary importance.

"Western Haydite is produced from the same shales as are used in the manufacture of Western brick, which have been widely used in the Middle West for the past 29 years. From the pit where it is loaded by two Bucyrus-Erie railroad-type shovels, the shale is hauled by steam dinkies in small, narrow-gauge cars to the foot of an incline cableway which takes it into the plant. Here the shale is dumped and ground by Frost dry-pans to a maximum size of 1½ inches. After grinding, the shale is conveyed to four rotary kilns of the same type as are used in the manufacture of Portland cement. These are fired with pulverized coal and gradually heated, reaching the highest heat zone of 2,000 deg. F. near the discharge end. Upon reaching this zone the shale becomes viscous, the carbon content has oxidized and formed gases, which expand the material into a light-weight, cellular structure, with partitions thoroughly vitrified. This clinker, discharged from the kilns, is conveyed to an outside pit, clammed to storage piles, loaded to cars drawn by a Plymouth locomotive, and hauled to the grinding plant where it is ground and screened to size ready for shipment, or is manufactured into blocks, slabs, tile and other building units."

MEN OF THE INDUSTRY

The portrait printed on this page in each number of PIT AND QUARRY is selected without significance as to current events or the position of the individual in the industry.

© Blank & Stoller

E. J. WINKLEMAN
Chief Engineer
Duquesne Slag Products Co.
Pittsburgh, Pa.

Personal Mention

H. A. Schaffer, formerly conservation engineer for the Portland Cement Association and later with the Bates Valve Bag Corp., has been engaged since May of this year in special investigations and consultation work for the Western Precipitation Co., Chrysler Building, New York. His work deals largely with the recovery of dust by the electric-precipitation method.

J. B. Johnson has been named to succeed the late C. F. Bierbauer as superintendent of the Hercules, Cal., explosives plant of the Hercules Powder Co. Other changes in personnel are as follows: **W. S. Brimijoin** succeeds J. B. Johnson as superintendent of the Emporium, Pa., explosives plant. **L. W. Babcock** succeeds W. S. Brimijoin as superintendent of the Kenvil, N. J., explosives plant. **M. M. Inskeep** succeeds L. W. Babcock as assistant superintendent of the Bacchus, Utah, explosives plant. **Andrew Van Beek** succeeds M. M. Inskeep as assistant superintendent at the Pluto explosives plant, Ishpeming, Mich.

Frank C. Dettelbach, president of the Utica Hydraulic Cement Co., La Salle, Ill., was elected president of the Illinois Valley Manufacturers' Club for the forthcoming year at a recent meeting of that organization. **Stuart Duncan,** director of the Marquette Cement Manufacturing Co., was elected vice-president and treasurer.

Fred S. Barrick has re-opened his gravel pit near Carpinteria, Cal., and is installing a crusher and screens.

H. H. Schuette and **H. Alder,** of the University of Wisconsin and the Wisconsin Geological and Natural History Survey, have recently completed interesting researches on the origin of limestone. Analyses of an aquatic weed (*Chara*) indicate that it absorbs large quantities of calcium carbonate from the water in which it grows. The reserves of calcium carbonate at the bottom of one shallow lake were shown to be augmented at the rate of about 1,000 tons per annum from this source.

Charles B. Bryant, for the past eight years connected with the Portland Cement Association in field engineering work in Virginia, Pennsylvania and Maryland, has been appointed senior assistant highway engineer of the state roads commission of Maryland.

N. D. Crowley, president and general manager, Ready-Mixed Concrete & Supply Corp., Albany, who was seriously injured in an auto accident several months ago, has recovered sufficiently partially to resume his duties.

Charles Baumberger

Charles Baumberger, president and general manager of the San Antonio Portland Cement Co., completed fifty years of service with the firm this fall. Mr. Baumberger first became connected with the San Antonio company as a part-time bookkeeper, and has held his present position since 1896. He was born and reared in San Antonio, Texas.

W. H. Allswede, vice-president and general manager of the Hersey Gravel Co., Hersey, Mich., has invented and applied for a patent on a new scrubber designed to remove clay balls and soft materials from gravel. The scrubber is being manufactured by the Greenville Mfg. Works and is being marketed by the F. M. Welch Engineering Service, Greenville, O.

Floyd Green, Columbus, O., representative of the Southwestern Portland Cement Co., has announced his candidacy on the Republican ticket for nomination as mayor of Columbus in the primaries to be held early next spring. Mr. Green has been a member of the Columbus common council since 1927.

J. D. Wood has resigned as commissioner of public works, State of Idaho, to enter private practice.

J. H. Watters, president of the Marion Steam Shovel Co. of Marion, O., has denied that the Marion Company is contemplating a merger with the Bucyrus-Erie Co. Rumors that such a merger was pending were heard in financial circles recently. **G. A. Morison,** vice-president and treasurer of the Bucyrus-Erie Co. of South Milwaukee, Wis., also declares that the report is entirely without foundation.

Charles D. Vail, manager of parks and improvements of Denver, Colo., has been appointed state highway engineer by Governor Adams, to fill the vacancy caused by the death of Louis D. Blauvelt on Oct. 26. The appointment is subject to the approval of the state civil service commission, which it is said is assured.

Obituary

Soichiro Asano, president of the Asano Portland Cement Co., died at Tokyo, Japan, on November 9. He was 82 years of age. Mr. Asano started his company, now the third largest producer of cement in the world, in 1882. He had also extensive shipping interests, including a line of passenger boats and freight vessels sailing from Japan to every port in the Pacific and around the world.

James S. Van Middlesworth, who has been associated with the Lawrence Portland Cement Co. for 42 years, died recently at his home in Brunswick, N. J., after an illness of six months. He was a director and secretary of the firm at the time of his death. Besides his widow, Mr. Van Middlesworth is survived by two brothers, J. Harry Van Middlesworth, Northampton, Pa., who also holds a responsible position with the Lawrence Portland Cement Co., and T. Wilson Van Middlesworth, of New Brunswick, treasurer of the Public Service Corp. of New Jersey, and one sister, Mrs. Ida Dickey, also of New Brunswick.

Henry Lang, vice-president of the Ingersoll-Rand Co., New York, died at his home in Montclair, N. J., recently, after a long illness. He was 66 years old.

Charles H. Markham, chairman of the board of the Illinois Central System, died at his winter home in Altadena, Cal., on Nov. 24 as the result of a series of paralytic strokes. He was 69 years old and had risen from section hand on the Santa Fe to the presidency of the Illnois Central. The most notable of his many improvements on the latter road was the electrification of the Chicago terminal. He resigned the presidency in 1926 and became chairman of the board.

Henry T. Pratt, well known in the wire trade of the Central West, died at his home in St. Petersburg, Fla., last month, aged 76 years. He was connected with the sales department of the American Steel & Wire Co. for 32 years of his active business life, having been for a considerable part of that period the company's district sales manager at Cleveland.

Coming Events

January 9-10, St. Louis, Mo. Annual convention, National Assn. of Paris Transit-Mixed Concrete Manufacturers. E. A. Landis, executive secretary, Portland, Ore.

Jan. 12-16, 1931, St. Louis, Mo. Annual convention and show, American Road Builders' Assn. Chas. M. Upham, engineer-director, National Press Bldg., Washington, D. C.

Jan. 19-22, 1931, St. Louis, Mo. Annual Convention National Crushed Stone Assn., Hotel Jefferson. J. R. Boyd, secretary, 1735 14th St., N. W., Washington, D. C.

Jan. 26, 1931, St. Louis, Mo. Annual convention of National Ready-Mixed Concrete Assn. New Hotel Jefferson. J. C. Eakin, secretary, Little Rock, Ark.

Jan. 27-29, 1931, St. Louis, Mo. Annual convention National Sand & Gravel Assn., Hotel Jefferson. V. P. Ahearn, executive secretary, Washington, D. C.

Feb. 10-13, 1931, Chicago, Ill. Fifth Midwest Power Engineering Conference. G. E. Pfisterer, secretary, 308 W. Washington St., Chicago.

Feb. 24-27, 1931, Wichita, Kan. Sixth Annual Southwest Road Show and School, Exposition Building. F. G. Wieland, manager, P. O. Box 1043, Wichita, Kan.

April 13-18, 1931. Cleveland, O. National Industrial Equipment Exposition, in connection with Congress on management, maintenance and materials-handling of A. S. M. E. G. E. Pfisterer, managing director, 308 W. Washington St., Chicago, Ill.

May 4, 1931. New York, N. Y. Thirteenth exposition of Chemical Industries, Grand Central Palace. International Exposition Co., managers, Grand Central Palace, New York.

Economical Exploitation of Small Pit Aided by Bucket Loader

WORKING over a period of four years withous repairs, loading and screening gravel at the rate of 1½ cu. yd. per min. and performing these loading and screening operations at a cost of only 7½c per cu. yd. is the record of a bucket loader owned by Charles E. Avery, retail gravel and road contractor, in his pit at Plainfield, Ill.

The machine in operation at the Avery pit is a Model 42 disk-feed, crawler-mounted bucket loader, equipped with a grizzly gravity screen and manufactured by the Barber-Greene Co., Aurora, Ill.

The Avery pit supplies both washed and bank gravel at an average output of 150 to 200 cu. yd. per day. The yearly output of the pit is estimated by Mr. Avery as around 22,500 cu. yd. The product is gravel mixed with sand, the gravel being about 2-in. The oversize amounts to about one-half bushel of 3-in. to 4-in. round "niggerheads" to the cubic yard.

The pit is worked on two levels with the Barber-Greene bucket loader, and a Bay City dredge. The lower level is a 30-ft. stratum, 15-ft. of which is under water and, from this, the dredge reclaims the washed gravel. The higher level is a 10-ft. bank from which 2½ to 3 ft. of overburden has been stripped. This higher level yields the gravel which the bucket loader excavates direct from the bank. The dredge and the loader work on the floor of this higher level. The whole operation — the dredge digging and storing, and the bucket loader loading the trucks alternately from the storage pile and from the bank—moves slowly in a single direction, the bucket loader making the top cut and the dredge taking the rest, thus thoroughly exploiting the pit. To make this pit pay even more efficiently, Mr. Avery is considering the installation of a crusher to render usable the oversize which is thrown out by the screen on the loader.

The feeding device of the Barber-Greene bucket loader makes it an admirable machine for pit work. It is mounted on a pair of sturdy crawlers which give it power to push into the pile. In case of too much cave-in, a patented overload-safety sprocket at the drive end of the machine automatically stops the bucket line without stalling the engine, thus protecting the machine from undue stresses.

This loader works nine hours per day, keeping Avery's four trucks moving, as well as the twelve or fifteen trucks of the township which buys its gravel at the loader. The machine was in continuous operation for four years without need of repairs. Last spring it was given a complete overhauling. The loader is operated by one man without a helper.

Figuring the operator's wages at $3,408, the upkeep of the machine (gasoline and oil) at $290, the depreciation on the machine at the rate of complete depreciation over a period of 10 years at $1,950, interest at $936, repairs and complete overhauling at the end of four years at $309, the annual sum total of $6,893 is reached. Dividing this total by 90,000—the output in cubic yards—the result is a cost of 7.65c per cu. yd. of gravel loaded. These figures cover the four years of operation of the machine.

Loader at the Avery plant in operation.

Ships Huge Crushers to Chilean Nitrate Field

The Nordberg Manufacturing Co. of Milwaukee recently completed a shipment of Symons cone crushers to Chile for the crushing of natural nitrate.

The order consisted of eight 7-ft. crushers consigned to the Anglo-Chilean Consolidated Nitrate Corp. for its Pedro de Valdivia plant in Chile. To make this shipment, eighteen cars were required, and the total weight was 1,225,000 lb.

When one considers the enormous capacity of these Symons cone crushers, the size of this reduction crushing job can be realized.

Financial News

The information contained in these financial pages is given with the understanding that any statement on the part of this magazine or any of its staff, as to the responsibility or standing of any person, firm or corporation, or as to the value of any property or securities is a mere expression of opinion, given as a matter of service to the readers of PIT AND QUARRY, *for which no responsibility in any way is to attach to this magazine or to any of its staff.*

U. S. Gypsum's Net Will Be About $4 per Share

The extra dividend of 50 cents per share on the common stock recently declared by the directors of United States Gypsum Co. was the first extra distribution of any kind voted in about two and one-half years. It followed a moderate upturn in earnings during the last twelve months, resulting from betterment in the price situation combined with low-cost operations in the large, new plants completed last year.

In June, 1928, Gypsum directors declared a 10-per cent stock dividend and offered stockholders rights to subscribe to additional stock at $20 per share, in the ratio of one additional share for each two shares held. During the following twelve months, earnings shrank sharply because of competitive conditions in the industry which led to drastic price cutting.

Improved conditions in the gypsum industry and settlement of patent litigation enabled Gypsum's net profits, in the second half of 1929, to show a slight increase over those of the corresponding period of 1928. As a result, despite the poor showing in the first half of 1929, earnings per share on the common stock outstanding at the end of the year were almost two and one-half times the regular cash dividend rate and earnings on the average amount of stock outstanding during the year were 3.3 times the rate.

The net profits of $2,891,750 in the first half of 1930 showed a further and more marked improvement than in the second half of 1929, and "reasonably satisfactory" profits are in sight for the second half, despite slackness in the building industry.

Although Gypsum reports earnings only semi-annually, the nine-months' net this year is estimated at about $3.40 per common share, against $2.24 per share on 1,170,370 shares in the first six months. For the full year, the company is likely to show a net profit of more than $4 per share on the common stock, which would compare with $3.98 per share on 1,149,290 shares outstanding at the end of 1929 and $5.33 per share on the average number of shares outstanding during that year.

Although an extra dividend of 50 cents per share on the more than 1,200,000 shares now outstanding is almost the cash equivalent of the extra dividend of $1 per share declared in 1927, both the regular and extra cash dividend requirements on the common stock for the full year were more than earned in the first half.

The extra dividend voted this year will require the distribution of $600,000 in cash as against almost $7,000,000 in cash and government securities held by U. S. Gypsum on June 30, last.

Canada Cement Co. Is in Good Financial Position

Canada Cement Co., Ltd., for the fiscal year ending Nov. 30 made a good showing, according to advices from Montreal, Ont. While most other industries have been adversely affected by the general business depression in the Dominion, Canada Cement's business has been well maintained, sales running even ahead of the unusually prosperous year of 1929.

For the twelve months ended Nov. 30, 1929, the company reported a net income of $1,600,701, equal, after 6½ per cent preferred dividends, to 38 cents per share on 600,000 shares of no-par common stock. This compared with 1928 net income of $1,396,951, or 5 cents a common share.

The earnings statement for the current fiscal year may not indicate as high a net income as last year, since the company probably will deduct from earnings a portion of the expenditures on the improvement of production and distribution facilities.

During the past two years a considerable amount has been expended on renovation of plants. Work of converting the Montreal East plant to a wet process has been nearly completed. The Hull, Exshaw, Winnipeg and Port Colburne plants were renovated earlier.

Partly to stimulate export business —which has not shown much progress in recent years—the company has added to its distribution facilities in eastern Canada. Last year, storage bins and packing plants were completed at Quebec and Halifax, and this year similar buildings have been constructed at St. John. A new 3,500-ton vessel supplies these distributing plants with cement and brings back from Nova Scotia gypsum which is used at the producing plants.

The rapid expansion of the hydro-electric industry in the Dominion, involving construction of a number of huge power plants, has been an important factor in the good business of Canada Cement this year. In addition, several of the provinces have increased their cement-highway mileage in an effort to attract motor tourists.

Construction projects, now in prospect, will further benefit the company. The $50,000,000 Canadian National Terminal in Montreal, now in the preliminary stages of construction, the proposed $65,000,000 subway project in the same city, the large amount of construction work involved in the unemployment-relief program sponsored by the Ottawa government, and continuation of hydro-electric developments assures the company of considerable business over the next few years.

Handling approximately four-fifths of the total Canadian cement business, Canada cement must benefit from the contemplated construction work. The company operates 15 plants in four provinces, with a total productive capacity of 12,000,000 barrels per year.

CURRENT DIVIDENDS

COMPANY	CLASS OF STOCK	DIVIDEND RATE	HOLDERS OF RECORD	PAYABLE	COMPANY	CLASS OF STOCK	DIVIDEND RATE	HOLDERS OF RECORD	PAYABLE
Alpha Portland Cement	Preferred	1¾% qr.	Dec. 1	Dec. 15	Metropolitan Paving Brick	Common	$0.50 qr.	Nov. 15	Dec. 1
Canada Cement	Preferred	1⅝% qr.	Nov. 28	Dec. 30	Metropolitan Paving Brick	Preferred	$1.75 qr.	Dec. 15	Jan. 2
Canada Paving and Supply	1st Pfd.	1¾% qr.	Nov. 15	Dec. 1	National Brick of La Prairie	Preferred	$0.75 qr.	Nov. 31	Dec. 15
Cleveland Stone Quarries	Common	$0.75 qr.	Nov. 15	Dec. 1	Newago Portland Cement	Preferred	$1.75 qr.	Dec. 26	Dec. 30
Cleveland Builders' Supply	Common	$0.50 qr.	Dec. 15	Jan. 1	New York Trap Rock	Preferred	$1.75 qr.	Dec. 20	Jan. 2
Consumers Co	Pr. Pfd.	$1.50 qr.	Dec. 15	Jan. 1	Peerless Cement	Preferred	$1.75 qr.	Dec. 20	Dec. 30
General Asphalt	Common	$0.75 qr.	Dec. 1	Dec. 15	Raybestos Manhattan	Common	$0.65 qr.	Nov. 30	Dec. 15
Giant Portland Cement	Preferred	$1.75 S.A.	Dec. 5	Dec. 15	Superior Portland Cement	Class A	$0.27½M	Dec. 23	Jan. 2
International Cement	Common	$1.00 qr.	Dec. 11	Dec. 30	Texas Gulf Sulphur		$1.00 qr.	Dec. 3	Dec. 15
Indiana Limestone	Preferred	1¾% qr.	Nov. 20	Dec. 1	United States Gypsum	Preferred	$1.75 qr.	Dec. 15	Dec. 30
International Salt	Common	$0.75 qr.	Dec. 15	Jan. 1	United States Gypsum	Common	$0.40 qr.	Dec. 15	Dec. 30
Johns-Manville	Preferred	$1.75 qr.	Dec. 11	Jan. 2	United States Gypsum	Common	$0.50 extra	Dec. 15	Dec. 30
Johns-Manville	Common	$0.75 qr.	Dec. 25	Jan. 15	Virginia Carolina Chemical	Pr. Pfd.	1¾% qr.	Nov. 17	Dec. 1
Kentucky Rock Asphalt	Preferred	1¾% qr.	Nov. 15	Dec. 4	Warner Co	1st Pfd.	$1.75 qr.	Dec. 15	Jan. 1
Lawrence Portland Cement		1% qr.	Nov. 31	Dec. 15	Warner Co	2nd Pfd.	$1.75 qr.	Dec. 15	Jan. 1
Material Service Corp		$0.50 qr.	Nov. 15	Dec. 1	Warner Co	Common	$0.50 qr.	Dec. 30	Jan. 15

Traffic News and Comment

New Complaints Filed

Cement

Complainants allege that the rates on cement from Glens Falls, N. Y., to New York City stations are unreasonable and unjustly discriminatory, being prejudicial to competitors at Howes Cave, Alsen, Hudson and Upper Hudson, N. Y., and points in Pennsylvania and New Jersey. They ask for reasonable rates and for reparation. I. C. C. Docket 24,010. Glens Falls Portland Cement Co., v. B. & A. et al.

Crushed Stone

A complaint of unreasonable rates on crushed stone from Middlepoint, O., to Grace Siding, Ind., and request for reparation is made in I. C. C. Docket 24,007. The Grace Construction & Supply Co., v. Indiana Service Corp. et al.

Rate Committee Dockets

NEW ENGLAND ASSN.

Crushed Stone

To meet motor-truck competition, shippers are proposing a reduction on stone (broken or crushed) from Westfield, Mass. to South Deerfield, Mass. The present rate is 95 cents and the proposed rate, 70 cents. This rate is to expire Nov. 30, 1931, unless sooner cancelled, changed or extended. Docket No. 21,241.

Sand and Gravel

Reductions on various rates to Springfield, Vt., are proposed by shippers to put these rates on a basis comparable with other rates in New England. Commodities are gravel (run of bank or screened or crushed), sand (common building), and stone (granite, trap rock, quartz or sand stone, crushed or broken), min. wt. Rates shown are per net ton.[1]

	Present	Proposed
Gravel from		
Manchester, N. H.	$2.20	$1.55
Westboro, N. H.	1.95	1.25
Sand from		
Manchester, N. H.	2.15	1.55
Westboro, N. H.	1.90	1.25
Stone from		
Greenfield, Mass.	2.25	1.40

CENTRAL FREIGHT ASSN.

Cement

Reductions are proposed by carriers on cement, c. l. min. wt. 50,000 lb., to Berrien Springs, Mich. Docket No. 26,833.

From	Proposed	Present
Cement City, Mich.	$0.12	$0.19
Coldwater, Mich.	0.11	0.17
Quincy, Mich.	0.11	0.17

Crushed Stone

Shippers at Bluffton, Ind., are asking for commodity rates on crushed stone and agricultural limestone (not ground or pulverized) in bulk, in open-top cars, c. l. min. wt. **Note 1**, to Big Four stations in Illinois. Class rates now apply. Rates shown are per net ton. Docket No. 26,787.

Chrisman, Ill.	$1.30
Marshall	1.35
Robinson	1.40
Lawrenceville	1.45
Mt. Carmel	1.50
Grayville	1.55
Carmi	1.55
Kansas	1.40
Mattoon	1.40
Shelbyville	1.45
Pana	1.45

* * *

Carrier is proposing reductions in the rates on crushed stone, c. l. min. wt. From Spore, O., the rates are, per net ton[1]: to White Cottage, Elizabeth, Lewts, Muskingum, So. Zanesville and Zanesville, O., 90 cents—present $1.05; to Stovertown and Cannelville, O., 90 cents—present $1.20; to Cannon, Saltillo and Crooksville, O., 80 cents—present $1.00; to Tropic, Misco, Sayre and Tatmans, O., 90 cents—present $1.10; to Congo, Drakes, Buckingham, Hemlock, Carrington, Shawnee and Hartleyville, O., 90 cents—present $1.10; to Mortonville, Hollister and Hunterdon, O., 90 cents—present $3.40. Docket No. 26,814.

Fluxing Stone

Carriers propose to establish on fluxing stone, c.l. min. wt. From the Bedford-Bloomington, Indiana, district to Portsmouth, O. a rate of $1.76 per gross ton[1]; to apply on shipments in open-top equipment unless other equipment is furnished for carrier's convenience. Present rate is $1.90 per net ton. Docket No. 26,830.

Lime

A joint through rate of 23 cents per 100 lb., on lime (common, hydrated, quick or slacked, except agricultural or fluxing) c.l. min. wt. 30,000 lb., from Gibsonburg and Woodville, O., to Green Bay, Wis., is proposed by carrier. The rate is to apply via Menominee only and represents the Menominee combination of 15½ cents from Gibsonburg and Woodville and 7½ cents to Green Bay. The present through rate is 29½ cents, sixth class. Docket No. 26,808.

Carriers propose to establish on lime, c.l. min. wt. 30,000 lb., from Mitchell, Ind., to Madison, Wis., a rate of 18 cents. The present rate is 21½ cents, min. wt. 30,000 lb., and 19 cents, min. wt. 40,000 lb.

Molding Sand

A rate of $4.74 per net ton from Bremen and New Lexington, O. to Elmira, Ont. is asked to apply on molding sand, c.l. min. wt. Class rates of 29½ cents and 30 cents, respectively, apply at present.[1] Routes specified are P.R.R. to Detroit and connections; or via P.R.R. to Ashtabula, O., and Port Burwell, Ont. and connections. Docket No. 26,791.

Reductions in rates on sand (glass or molding) c.l. min. wt., to Rochester, Mich., are proposed by shippers. Rates are per net ton.[1] Docket No. 26,831.

From	Proposed	Present
Ausanba, Ky.	$2.52	$3.15
Mentor, Ky.	2.52	3.15
Lawton, Ky.	2.64	3.27

The proposed rates now apply to Lapeer, Mich., Rochester being intermediate to Lapeer.

Sand and Gravel

In lieu of the present combination rates, shippers are asking for through rates on sand and gravel, c.l. min. wt. from Steubenville, O., to stations on the W.&L.E. in Ohio as follows, in Docket No. 26,778. Rates are per net ton.[1]

Oneida, O.	$1.00
Connotton	0.80
Jewett	0.85
Pittsburg Jct.	0.85
East Cadiz	0.85
Unionvale	0.90
Adena	0.90
Maynard	0.95
St. Clairsville	1.00
Neffs	1.00
Herrick	0.90
Dun Glen	0.95
Dillonvale	0.95
Glen Run	0.95
Connor	0.95
Warrenton	0.95

SOUTHERN FREIGHT ASSN.

Crushed Stone

A general revision of the rates on crushed stone from Hitchcock Mill, Va., to Southery Ry., Norfolk Div., stations, Nelson to Capon inclusive, is asked by shippers. Carriers have suggested rates on the basis of I.C.C. Docket 17,517 joint line scale, c.l. min. wt.[1] Docket No. 52,803.

In lieu of present combination rates, it is proposed to establish, for intrastate application, rates on crushed stone, c.l. min. wt.[1] From Boxley, Va., to stations on the N.&W. Railway between Norfolk and Petersburg, Va., viz.: $1.50 to South Norfolk; $1.40 to Gilmerton, Yadkin and Brico; $1.30 to Ligon, Dwight and Dane; $1.20 to Logman, J. W. Rogers, 57-Mile Siding, Vaport, Dillion (Henry Co.) and Fargo; and $1.10 per net ton to Disputanta, Hobbs, Saunders and New Bohemia, Va. Docket No. 52,900.

Shippers are asking for through rates on stone (crushed, rubble or broken) carloads, from Marion and Schuleen, Va., to Southern Ry. stations between Briston and Mountain City, Tenn., on the basis of Docket 17,517 joint line scale; from Marion, Miles, Pembroke and Ripplemead, Va., to Southern Ry. stations between Bristol and St. Charles, Va., including Ayers and Yuma, Va., on basis of Docket 15,216 joint line scale; and to Southern Ry. stations in Tennessee south of Moccasin Gap, Va., to Bulls Gap, Tenn., on basis of Docket 17,517 joint line scale, holding above suggested rate to Moccasin Gap, Va., as minimum to stations in Tennessee south thereof. Statement of the proposed

rates will be furnished upon request. Docket 52,789.

Crushed Stone, Sand and Gravel

In lieu of combination rates, it is proposed to establish rates on sand, gravel, crushed stone, slag, rubble, broken stone and chert, in straight or mixed carloads, min. wt., from Glenita and Harpers Siding, Va., to L.&N. Railway, Cumberland Valley Div., stations in Virginia, on basis of I.C.C. Docket 17,517 joint line scale.[1] Statement of proposed rates will be furnished upon request. Docket No. 52,860.

Ground Limestone

It is proposed to establish through rates on limestone (ground) c.l., from Carterville, Ga., and Sparta, Tenn., to Little Rock, Ark., of $3.60 and $2.73 per net ton respectively, in lieu of present rates, $3.94 and $3.07 respectively. The proposed rates are on basis of Memphis, Tenn., combination. Docket No. 52,832.

Lime

It is proposed to cancel current rates on lime, c.l., from Milltown and Marengo, Ind., to points in the Mississippi Valley and to points in Kentucky intermediate to the Valley via the direct lines and revise them on a relative basis with those in effect from Louisville, Ky., and Evansville, Ind. Statement of proposed rates to representative points will be furnished on request. Docket No. 52,834.

Shippers are asking for cancellation of the arbitrary rate of 3½ cents per 100 lb. authorized over New Albany, Ind., in constructing rates on lime, c.l., from Milltown and Marengo, Ind., to points in the southeast and Carolinas published in Rate Bases 200 and 201 of Agent Speiden's Origin Basis Book No. 39-K, and Rate Bases 225, Agent Speiden's Carolina Tariff 45-G; and to publish a specific rate of 70 cents per net ton on lime, c.l., from Milltown and Marengo, Ind., to New Albany, Ind., to be used in constructing rates to points in the southeast and Carolinas using, beyond New Albany, the rates published in Agent Speiden's Lime Tariff 186-A. Docket No. 52,835.

Talc

It is proposed to establish a through rate of $5.89 per net ton on talc (crude or ground) c.l. min. wt. 50,000 lb. from Chatsworth, Ga., to Tampa, Fla. At present the combination rate applies. Docket No. 52,766.

Crushed Stone, Sand

New rates proposed by carriers on crushed stone, sand, chats, zinc tailings and cinders, c.l. min. wt. 60,000 lb., except where car is loaded to full visible or space-carrying capacity, in which case actual weight will govern, from origins on the K.C.S. and J.&P. Ry. Joplin district, as shown in group 2, K. C. S. Tariff 412E to K.C.S. stations, per net ton are,

To	Rate
West Line, Mo.	$1.10
Drexel	1.05
Merwin	1.00
Armsterdam	1.00
Amoret	0.95
Hume	0.90
Amos	0.90
Stotesbury	0.85
Richards	0.85
Eve	0.80
Roe	0.80
Swart	0.80
Hand	0.80
Oskaloosa	0.75
Mulberry, Mo.-Kan.	0.70

The scale proposed is the Missouri State single line scale as applied from cross country origins on the M.P. for like distances, and it is desired to publish the state scale for interstate application through Kansas. Intermediate destinations in Kansas will not be affected because carrying a lower rate than is proposed to destinations in Missouri. Docket No. 21,525.

Status of Proposals

A brief summary of the disposition of items, published in previous issues, of the Southern Freight Assn. dockets are given here.

Reported on page 79 of Oct. 8, PIT AND QUARRY.

No. 52,139. Lime from Lyle, Tenn. Withdrawn by proponent.

Reported on pages 65 and 66 of Nov. 19, PIT AND QUARRY.

No. 52,302. Estimated weights on crushed stone. Final conclusions not reached.

No. 52,307. Phosphate Rock. Final conclusions not reached.

No. 52,332. Crushed marble from New Orleans. Amended, and authority for publication issued.

No. 52,387. Crushed stone coated with oil, tar or asphaltum from Snow Flake, W. Va. Proposal approved.

No. 52,389. Calcite from Cartersville, Ga., and Sparta, Tenn., to Chardon. Submitted for concurrence to other associations interested.

No. 52,393. Gravel from Gravelton, N. C., to Warners, N. J. Submitted for concurrence to other associations interested.

No. 52,423. Crushed marble from Tate, Ga., to Good Hope, La. Proposal approved.

No. 52,454. Cancellation, cement, from Sandersville, Ga. Proposal approved.

No. 52,467. Sand and gravel, from Twohy Siding, Va., to points in Virginia. Proposal approved.

Lime

Carriers propose to establish the following rates in cents per 100 lb. on lime, c.l. min. wt. 30,000 lb., from Mercer, Ark., to Sokog, Kan., Genako, Mile 19, Miles, Quapaw and Miami, Okla., 15½ cents; Traber and Fairland, Okla., 17 cents; Clarita, Bromide Jct., Galbreath, Bromide, Wapanucka, Coleman, Kenefick, Ury and Durant, Okla., 29 cents and to Henryetta, Okla., 26½ cents. The foregoing destinations are on the K.O.&G. To the following St.-L.S.F. stations: Miami, Quapaw and Ontario, Okla., and Goodeagle, Kan.-Okla., 15½ cents; Muskogee, Okla., 22½ cents; and Durant, Okla., 29 cents. The rates on lime from Mercer, Ark., to Oklahoma and Kansas are, generally speaking, based 1½ cents per 100 lb. over the rates from Ash Grove, Mo., and is the basis proposed. The establishment of rates to Muskogee and Durant on the St.L.S.F. is for the purpose of meeting the competition of the M.K.&T. Docket No. 21,497.

Shippers are asking for a rate of 26 cents per 100 lb. on lime, c.l. min. wt. 30,000 lb. from Ash Grove, Galloway, Osceola, Pierce City, Sequiota and Springfield, Mo., and Johnson's, Ark., to Drumright, Okla. Docket No. 21,544.

Gypsum Rock

A commodity rate of 14½ cents per 100 lb. on gypsum rock, c.l. min. wt. 90 per cent of marked capacity of car, from Winnfield, La., to Dallas, Tex., is proposed by carriers. It is stated that a large deposit of gypsum rock has been discovered in the vicinity of Winnfield, La., and a crushing plant at that point expects to begin shipping the rock in the near future provided a rate is established on which this low-grade traffic can move. Docket No. 21,559.

TRANSCONTINENTAL BUREAU

Gypsum Products

Shippers request that Item 970 (covering gypsum building blocks and tile, agricultural gypsum, wall plaster, plaster of Paris, plasterboard and stucco, west-bound) of Transcontinental tariff 29-T be made to also apply on shipments destined Hawaiian Islands. Docket No. 11,743.

[1] The proposed carload minimum weight will be 90 per cent of the marked capacity of the car except that, when car is loaded to full cubical or visible capacity, the actual weight will apply.

Questions and Answers

Question.—We produce only washed lake sand and gravel which are pumped aboard our boats and unloaded to our docks and sold by both carload and truckload to our customers. We have one grade of sand that is used for both building purposes and for core work, though there is no process through which it is put to prepare it for foundry use. It is loaded direct into cars and trucks from our stock-piles. The railroads maintain that where this sand is used for foundry purpose it should take the higher rate of freight, although all our sand is billed out as common sand, they changing the billing to read "foundry sand," when they find it is to be used for that class of work. For example, we have a rate of $1.20 per ton to P——— on building sand and, if this same sand is used for foundry work, they charge a rate of $1.76 per ton. Our understanding is that railroads are not allowed by the Interstate Commerce Commission to base

(*Continued on Page 69*)

Review of Foreign Practice

Area Surrounding Paris Has High Gravel Output

A good idea of conditions in the sand-and-gravel industry in the Paris region can be obtained by a study of the operations of the Etablissements Morillon, G. Corvol et Cie., as this company has been specializing in the production of sand and gravel since 1848 and its plants illustrate handling methods prevalent in the district all the way from archaic hand methods to mechanical methods of the most improved type. Stripping of small thicknesses or volumes is done by hand pick and shovel, the spoil being hauled away, generally in cars of the Decauville type, either by animals or by small locomotives, depending on the distance involved. For greater quantities of stripping the company has special stripping machines consisting of a chain of buckets operated from a tower moving on rails; also, caterpillar-mounted power shovels and draglines, and some floating clamshell dredges for stripping areas adjoining lakes or streams.

The deposits available are of three types: deposits in the bed of the Seine, old river sands, and recent alluvial deposits. The Seine has been so long and so continuously dredged that deposits of the first type are no longer of much importance. Deposits of the second type, being mainly decomposition products, are fine-grained and contain much clay, and are little used. Most of the sand and gravel used in the district are taken from recent alluvial deposits alongside the rivers and in the valley plains. There is a great variety in the excavating methods employed, including the chain-bucket excavator similar to the type used in stripping but carrying screens which separate the material and load sand and gravel separately into cars; and several types of floating dredges, the most used being a type of ladder dredge, which carries screening equipment to sort the product into gravel and sand and to reject the oversize. Besides the screening equipment on the excavators the company also operates a large modern screening plant to which material is hauled in barges, with a capacity of 1,000 cubic meters per single-shift day.

Because of the scattered operations and the low price paid on the Paris market, the company has devoted much study to economical methods of transport. Some material moves to the city by rail, but most of it is shipped by water, particularly by a fleet of special hopper barges and a number of tow boats of from 100 to 500 hp. It also has several self-propelled cargo boats with oil engines of 50 to 100 hp. The material is unloaded by a variety of dock cranes with grab buckets, some being fixed in location and others mounted on trucks. An interesting recent development is a special self-unloading cargo boat, 35 m. long, equipped with a 100-hp. oil engine which, when the boat is docked, drives a generator supplying electric current to the drag buckets and belt conveyor that move the cargo from the hold to piles on the bank.—J. Prouteau in *Mines, Carrieres, Grandes Entreprises* 9:C73-81 and C85-91, July and August, 1930.

Effect of Mixing Water on Strength of Mortar

For years it has been known that there is a great difference in strengths of mortars and time of set in testing cement in different laboratories, this variation amounting at times to as much as 20 per cent. A given cement, for instance, may give a mortar of less compressive strength at one laboratory than at another and, at the same time, a higher tensile strength. This article reports on a study of the chemical analyses of the water available in the city systems in twenty large German cities. The effect of electrolytes such as $CaCl_2$, $CaSO_4$, $MgCl_2$ and NaCl on the strength and the setting time are, of course, well known from previous investigations. In this investigation a special comparison of strengths when using Karlsruhe water with strengths when using distilled water was made, on several different varieties of cements in Germany. The effect on the individual cements varied but, in general, mortars with Karlsruhe mixing water showed lower compressive and higher tensile strengths than mortars made with distilled water. Inasmuch as the waters vary in different parts of Germany, the authors recommend the adoption of a standard water for making laboratory tests, and that this be distilled water. The authors also investigated the effect of different waters for storage of testing specimens, but found that the strength of the specimens was practically not affected by different storage waters.—E. Probst and K. E. Dorsch in *Zement* 19:1009-1011, Oct. 23, 1930.

Calcination of Gypsum in Special Rotary Kiln

A special type of rotary kiln, said to be the only one of its kind, is in operation at the plant of the Etablissements Vallee-Bourdet at Triel in Seine-et-Oise near Paris. It is known as the "Andre Bourdet" kiln, and is of the type that provides a direct contact between the gypsum and the hot gases, but of a new construction to permit the realization of a new thermic cycle and very economical results. With this kiln it is possible to obtain different calcined products as one modifies the temperatures. The system is continuous and conditions are comparable to the rotary cement kiln.

This kiln consists essentially of two rotating tubes superimposed in the same housing, through which flow the pulverized gypsum and hot gases led from some exterior source. The material is introduced first into the upper tube where the temperature is higher, and flows in the same direction as the gases. Then the gypsum passes to the lower tube, through which it moves countercurrent to the flow of the gases. A special ventilating arrangement carries away the vapors resulting from the dehydration. Each tube is followed by a dust-settling chamber. The kiln in operation at Triel produces easily 2.5 to 3 tons of calcined gypsum per hour, and the material is of excellent quality.—P. Dumesnil in *Revue des Materiaux de Construction* No. 250, pp. 271-273, July, 1930.

Salt-Handling Plant in Somaliland, East Africa

The salt works at Hordio in the sultanate of Migiurtinia, on the Italian coast of Somaliland in East Africa, which were worked on a small scale for many years, were destroyed, in 1925-26, during an insurrection, and have been rebuilt on a larger scale for mechanical production. Salt is produced from the water of the Indian Ocean led through a system of canals to basins where, because of the intensity of the sun, the water is evaporated at the rate of 18 mm. a day. The salt is heaped up mechanically into high piles to drain and, later, is spread out in great prismatic dryers and left in the open air several months. The salt works are several miles from the loading point at Hafun, with which they are connected by an aerial tramway in two sections—the first 14.4 kilometers long, driven by a 220-hp. motor, the second 9.2 kilometers long, driven by a 150-hp. motor. Each has a capacity of 75 tons per hour, which can be increased at any time to 150 tons per hour by simply increasing the number of buckets on the line.

At the loading plant, salt is discharged to six hoppers from which it is fed into crushers and then is carried by a belt conveyor to load either a second aerial tramway 1.83 kilometers long (carrying the salt out over the water to the actual boat-loading station) or to a large storage room 60 meters long and 15 meters high, holding 17,000 tons of salt which is later reclaimed by a tunnel underneath as needed for shipment.—*Mines, Carrieres, Grandes Entreprises* 9:M 121-124, Aug., 1930.

Recent Patents

AMERICAN

Loading

Hoe-type shovel crane. Leslie A. Russell, Milwaukee, Wis., assignor to Koehring Co., same place. No. 1,783,055.

Instroke shovel crane. Leslie A. Russell, Milwaukee, Wis., assignor to Koehring Co., same place. No. 1,783,056.

Material Handling

Concrete-distributing apparatus. Alexander MacDougald, Atlanta, Ga., assignor to MacDougald Construction Co., same place. No. 1,782,734.

Cement spreader. Ralph M. Hardgrove, Allentown, Pa., assignor to Fuller Lehigh Co., Fullerton, Pa. No. 1,782,820.

Screening

Screen for disintegrating machines. Arno Andreas, Munster, Germany. No. 1,782,953.

FOREIGN

Blasting

Explosive. Dynamit Akt.-Ges. vormals Alfred Nobel & Co. French 696,632.

Cement

Process for neutralizing sulphur compounds in fused masses from raw phosphates, especially in fused cements. Dipl.-Ing. Wladimir Kyber. German 511,520.

Process for production of fused cements. Ernst Moyat. German 511,521.

Process for reducing the water content of lime or cement raw slurry. Dr.-Ing. Hugo Vierheller. German 511,513.

Fused cement. La Societe d'Etudes Chimiques pour l'Industrie (Joseph Breslauer). Canadian 305,938.

Hydraulic mortar and cement. Wilhelm Reismann and Rudolf H. Schloss. Canadian 305,965.

Concrete

Apparatus for manufacturing cement concrete. Modern Concrete Development Co., Ltd. (Arthur Cyril Knipe). Canadian 306,116.

Process of manufacture of an artificial aggregate for the preparation of concrete. J. E. Greenawalt. French 696,067.

Crushing and Grinding

Centrifugal grinding mill. Eduard Boehme and Harzer Achsenwerke G. m. b. H. German 511,695.

Drive for gyratory crusher. Fried. Krupp Grusonwerk Akt.-Ges. German 512,606.

Disintegrator construction. Heinrich Nolze. German 512,186.

Grinding mills. G. F. Pettinos. British 317,710.

Grinding mills of the swing hammer or beater type. J. P. van Gelder. British 317,446.

Impact pulverizing mills. Hartstoff-Metall Akt.-Ges. (Hametag). British 318,145.

Grinding pans. J. Drysdale and A. E. Bottomley. British 337,618.

Paddle for the impact type of pulverizers. The Fuel Efficiency Engineering Corp. (Walter Willis Pettibone). Canadian 305,681.

Process and apparatus for grinding materials of all kinds, particularly materials bearing water. B. Jirotka. French 696,214.

Crushers for coal, rock and similar materials. H. Martinez and R. H. Kirk. French 696,500.

Drilling

Drilling machine. Francois Jacques Barthelemy Berry and Paul Guerre. German 511,011.

Lubricating device for hammer drill. Henry Samuel Potter. German 511,574.

Portable drill. George Henry Thompson. German 512,332.

Rock drills. R. A. Bedford. British 337,617.

Driers

Apparatus for removing fluid from wet, finely divided material. Ludwig Altpeter. German 511,300.

Process for drying finely divided material. Techno-Chemical Laboratories, Ltd. German 512,327.

Drying apparatus. Fritz Haas. German 512,329.

Portable air heater for drying purposes. Hagener Elektrizitaets-Industrie Lothar Otto G. m. b. H. German 512,330.

Driers. Coe Manufacturing Co. British 314,013.

Driers. A. E. White (Coe Manufacturing Co.). British 337,432.

Excavating

Stripping apparatus. Luebecker Maschinenbau Ges. German 511,110.

Scraper excavator. Maschinenfabrik Hasenclever Akt.-Ges. and Heinrich Kluepfel. German 511,314.

Loading machine with scraper device. Heinrich Kluepfel and Heinrich Becker. German 511,801.

Scraper-mining apparatus. Arthur Kanczucki. German 512,028.

Scraper excavator. Demag Akt.-Ges. German 512,396.

Mining machines. F. W. Hurd. British 337,281.

Turtle-back reinforcing casting for dipper doors. American Manganese Steel Co. (Daniel H. Meyer). Canadian 305,642.

Steam shovel bucket. Grover C. Voit. Canadian 306,042.

Point dipper tooth. Southern Manganese Steel Co. (John O'Fallon Clark). Canadian 306,138.

Excavator tooth base. Southern Manganese Steel Co. (John O'Fallon Clark). Canadian 306,139.

Power shovel. P. P. I. Fourlinnie. French 696,060.

Power shovel. Bamag-Meguin Akt.-Ges. French 695,960.

Firing

Pulverized coal firing. Carl Hufschmidt. German 511,098.

Pulverized coal firing installation. Stug Kohlenstaubfeuerung Patentverwertung G. m. b. H. German 511,829.

Supplying of pulverulent material to combustion apparatus and other apparatus. F. K. Woodroffe. British 336,989.

Burners for the combustion of pulverized solid fuel. F. K. Woodroffe. British 336,952.

Gypsum

Process for production of a weather-resistant gypsum mortar. Dr.-Ing. Otto Richter. German 512,325.

Method of treating gypsum and resulting products. Bemis Industries, Inc. (Christian Jamarra.) Canadian 305,651.

Kilns

Roller support for revolving shells of all sorts. Fried. Krupp Grusonwerk Akt.-Ges. German 512,202.

Sintering apparatus. National Processing, Ltd. (George Eric Storer). Canadian 305,717.

Lime kiln. L. Rigaud. French 695,343.

Tunnel kilns. Woodall Duckham (1920) Ltd. and A. McDougall Duckham. French 696,563.

Process and apparatus for the utilization of the sensible heat of the gases lost from a rotary kiln. Fellner & Ziegler Akt.-Ges. French 696,602.

Lime

Lime hydration plant. Stanley Travis. Canadian 305,825.

Material Handling

Cableway for removing stripping spoil. Luebecker Maschinenbau Ges. German 511,109.

Conveying apparatus. Fried. Krupp Akt.-Ges. German 511,184.

Shaking trough conveyor on ball bearings. Maschinenfabrik G. Haushen, E. Hinselmann & Co. G. m. b. H. German 511,721.

Elevator bucket. Emil Kuhn. German 511,630.

Apparatus for uniform transference of material from one space to another. Brennstoff-Verschwelung G. m. b. H. German 512,014.

Device for transferring loose material from one row of bins to one below it. J. Pohlig Akt.-Ges. German 512,015.

Apparatus for discharging loose material. Karl Schmidt. German 512,209.

PIT AND QUARRY *will furnish, at its actual cost, a copy of any patent cited here. A charge of ten cents per copy is made by the U. S. Patent Office, Washington, D. C., and readers may procure a copy directly by addressing the Commissioner of Patents, with payment for copies requested. Postage stamps are not accepted by the Patent Office. We will endeavor to obtain copies of foreign patents for our readers but we cannot give assurance in every case for the reason that copies of such patents are not printed for distribution as liberally as are the American copies, nor is there a fixed charge per copy.*

Process and apparatus for conveying pulverized materials, particularly pulverized coal. Allgemeine Elektricitaets-Gesellschaft. German 512,635.

Device for regulating the movement of cars in rotary dumpers. Carl Notbohm. German 512,210.

Loader conveyors of the belt type. Mavor & Coulson, Ltd. and J. Thomson. British 337,129.

Carriers for use on ropeways. Ceretti & Tanfani Soc. Anon. British 337,669.

Conveyor belt. Goodyear Tire & Rubber Co. (Raymond S. Carter). Canadian 305,900.

Wire conveyor belt. Wickwire Spencer Steel Co. Canadian 305,953.

Conveyor. Coe Manufacturing Co. (James Lockhart and Richard C. Moore). Canadian 306,080.

Carriage for aerial tramway. Seilbahn Akt.-Ges. French 695,408.

Device for attaching carriages of aerial ropeways. Adolf Bleichert & Cie. Akt.-Ges. French 695,425.

Elevator. Etablissements des Elevateurs d'Eau Dragor & Alma. French 695,556.

Shaking conveyor. T. B. Wilkinson. French 695,633.

Driving mechanism for shaking conveyors. T. B. Wilkinson. French 695,671.

Mixers

Rotary mixing machines. O. H. Fornado. British 337,634.

Machine for mixing concrete or other materials. V. Prispanen. French 696,281.

Sacking

Sack-closing device. Philipp Burger. German 511,103.

Reinforced valve bag and method of producing same. Cornell Multi-Wall Valve Bag Co. British 337,517.

Separating

Screening device. Kohlenscheidungs G. m. b. H. German 511,849.

Drive for screen. Amme-Luther Werke Braunschweig der "Miag" Muehlenbau und Industrie Akt.-Ges. German 511,797.

Pumpings from the Old Pit

Excerpts from the old files of PIT AND QUARRY *reveal many interesting sidelights on the activities of the pits, quarries and plants of former days. These, interesting by comparison with practices in vogue today, are printed in this column each issue.*

Fourteen Years Ago

Motor trucks had been adopted by the Gates Sand & Gravel Co., Charleston, W. Va., as its exclusive means for delivering its products. The teams and wagons were discarded, although figures were lacking for the probable costs of trucking, reliance being placed upon the increased speed and efficiency. A record was kept on the performance of one truck during its first working day. It made 18 round trips of 2.4 mi. each and one round trip of 8 mi., hauling 5 cu. yd. to a load, and consuming 25 gal. of gasoline and 1 gal. of oil.

Ten Years Ago

The storage of ground limestone and phosphate rock prepared as ingredients for the mixing of fertilizers was discussed in an illustrated article by J. R. Bent of the Illinois Agricultural Assn. Open stockpiles, structural enclosures and concrete silos were described. Trackage, permanent and portable conveyors, trolley carriers, bucket elevators, trestles, and chutes were included in the eight different designs of storage facilities.

* * *

A "valley period" prevailed in eastern construction activities. Producers and dealers were maintaining stability in prices for materials and were optimistic. Crushed-stone operators reported the best situation because the late fall was favoring road construction. A special committee of the U. S. Senate had held sessions in New York for several weeks investigating prices of construction materials.

* * *

The Washington Sand & Gravel Co. operating a plant near Bladenburg, Md., employed dynamite to remove four to six feet of overburden. In one shot described, seven holes were drilled 8 ft. back from the bank, 4 ft. deep, and 2.5 ft. apart. Five sticks of 40-per cent dynamite were charged in each hole and fired electrically.

Five Years Ago

The operations of the Atlas Rock Co. of Stockton, Cal., were described by H. W. Munday. To fulfill a contract to furnish aggregates for the construction of the Melones dam, this company doubled its plant's capacity to 2,000 tons per day. An adventitious profit was effected by the recovery of gold from the gravel, the extraction ranging between five and ten cents per ton. A similar practice prevailed in the plant of the Grant Rock & Gravel Co. at Friant, Cal., according to E. D. Roberts in another article. The gold was collected by passing the gravel over concentrating tables.

* * *

Reviewing the year's progress in the cement industry General Manager W. M. Kinney of the Portland Cement Assn. stated that American plants had an annual capacity of about 185,000,000 bbl. and "producers are well prepared for whatever demands the construction field may make during the approaching new year." B. F. Affleck, president, Universal Portland Cement Co., said that "a 1926 producing capacity more than 20 per cent in excess of the most that has been used in any year must be viewed."

* * *

Otho M. Graves, president of the National Crushed Stone Assn. and general manager of the General Crushed Stone Co., predicted that 1926 would prove "reasonably successful."

Traffic News

(Continued from Page 66)

their rate on the use to which a commodity is put.—A. B. T.

Answer.—There are two ordinary descriptions of sand given in tariffs: "Sand (foundry or molding)" and "Sand (other than foundry or molding)." Now if the tariffs covering the movement of this traffic use these descriptions your shipments must be billed under one description, but not under both. If it is foundry or molding sand it should be so billed, or if it must be prepared in the foundry and is not foundry sand when it leaves your plant it should not be so billed. The fact that the carriers are willing to accept shipments consigned to the building trade as "common or building sand" would indicate that they are satisfied with that description. They would not know that a foundry intended to use the sand for building purposes.

Charging different rates on the same commodity for identical or even like service is in violation of the second section of the Act to Regulate Commerce. In a similar case before the Commission, Docket 3,731, Virginia-Carolina Chemical Co. v. A.C.L., reported in 22 I.C.C. 394, it was found that there was one rate published on "fertilizer," and a lower rate on "fertilizer, when consigned to fertilizer factories." In this case the commission stated:

"Rates which were formerly in effect on fertilizer, 'when consigned to fertilizer factories,' could only have the effect of discriminating between the shippers or the receivers. The rule is well established that a rate cannot be based upon the use to which a commodity is to be devoted; neither can a rate be confined in its terms to an individual or a class; it must be open to all shippers alike."

Section 2 of the Act goes further and says that there must not be discrimination between commodities of like character and that it is not necessary that forms be identical. As an example, we cite the case of D. Nagase & Co., Ltd. v. Director General, et al., 22 I.C.C. 422. The Commission says "we find . . . . that potato starch and potato flour are a like kind of traffic in the meaning of that term as employed in Section 2 of the Interstate Commerce Commission Act and that the rates assailed were unjustifiably discriminatory to the extent that they exceeded the rates contemporaneously applicable between the same points on potato flour."

No doubt you have made a shipment of sand to P——— on which the lower rate was charged and another shipment on which the higher rate was charged. It will be necessary for you to prove that the sand in both shipments shows like character and it will also be necessary to prove that it was not molding sand, that is, if your tariff reads, "Sand (other than molding)." No doubt the foundries would have to dry the sand or put it through other processes before it could be termed "molding sand."

If this case is carried to the Commission, you will want to be sure that the orders you receive from the foundries, as well as your acknowledgments of the orders and your invoices, do not read "molding sand," for these documents must be presented to show that molding sand was not ordered or shipped.

As this seems to be a queer case of discrimination, it is possible that it can be settled without going to the Commission. Perhaps we could give more specific advice for handling this matter if you would give us the name of the railroad, the tariffs in which the rates are found, and the name and title of the official or employee who has ruled that the rate to be assessed shall not be determined by the business of the consignee. We will not publish any of this information, but want to help you to secure the refunds which may be due you or your customers at the very lowest cost, for litigation is expensive.—EDITOR.

Legal Information for Operators

Rules Gravel Firm Must Pay for Use of Deposit

When interpreting the terms of a written instrument a liberal and fair construction will be given to the words, either singly or in connection with the subject-matter. It has been held by numerous Courts that the legal construction is that which is made by viewing the subject of the contract as the mass of mankind would view it. It is only where the language in which the parties have expressed themselves is ambiguous that the Courts may resort to conjecture to determine such intention. Under these circumstances the Courts endeavor to arrive at the original intentions of the contracting parties.

An example of this phase of the law is found in the recent case of Makins v. Shellenbarger, 289 Pac. 716. In this case a sand-and-gravel company leased land for fifteen years to be developed for commercial sand. The lease gave the sand company the privilege of testing the land at any time within first five years, to remove improvements, dig pits, quarries, use the water on the premises, extend the lease for a period with or without notice to the lessor and develop the property or abandon the same at will without further liability. The contract also contained a clause as follows:

"In the event yardage removed should not yield the lessor (property owner) on a basis of 15 cents per cubic yard the aggregate during a period of each succeeding calendar months hereafter, the lessee (sand company) be and is hereby nevertheless bound and required to pay the lessor the sum of Five Hundred Dollars ($500) for each and every twelve calendar months during the life of this contract, as a minimum royalty, and if the basic royalty of 15 cents per cubic yard should yield less than $500 per each twelve calendar months during the life hereof, the difference between the total of such royalty and the minimum royalty of $500 shall and will be paid at the end of each twelve months period, or fractional part thereof, during the time this lease remains in force and effect."

Litigation developed when the sand company contended that payment of a minimum of $500 per year was not intended during the five-year test period. However, the Court held the sand company bound to pay a minimum of $2,500 during this five year test period, saying:

"A painstaking reading of this instrument convinces us that this minimum rent or royalty was to be paid at the expiration of each year following the execution of the lease. . . . It would be a strange contract which turned over plaintiff's land to defendant (sand company) for a period of five years without compensation and with simply the option, but no obligation on the part of defendant, to either test it or develop it. The provision in the lease for the payment of a minimum rent or royalty of $500 per year was about the only incentive the defendant had in making prompt development, and likewise was about the only consideration to the plaintiff for tying up his land in a long term."

Derrick in Quarry Not Contractor's Equipment

It is interesting to observe that in Bedford-Carthage Stone Corp. v. Missouri-Kansas-Texas R. Co., 25 S. W. (2d) 930, a higher court held that a contractor's derrick and similar equipment used in a quarry, can not be shipped under the classification of a contractor's outfit.

In this case it was disclosed that the Bedford-Carthage Stone Corp. shipped a carload of quarry equipment and machinery, which weighed 31,140 lb., of which approximately 30,000 lb. consisted of a derrick. The car was billed as second-hand stone-quarry machinery and it was an intrastate shipment.

The state railroad commission had fixed a rate on "contractors' or construction camp outfits" as class C, which rate, if applied to the shipment would have been 61 cents. The rate for the shipment of derricks and cranes is fixed as class A and carries a rate of 90 cents.

The Bedford-Carthage Stone Corp. refused to pay the freight on the basis of the 90-cent rate. The real issue, therefore, was whether the shipment of freight in controversy comes under the head of "contractors' or construction camp outfits," or under the head of derricks.

In holding the stone company bound to pay the 90-cent rate, the court said:

"The court found that appellant (stone company) was not a *bona fide* contractor, within the contemplation of the tariff rate made applicable to 'contractors' or construction camp outfits,' but that it was in the stone-quarrying business, and further found that the shipment of freight involved in this controversy did not contain any portion of a bona fide 'contractors' or construction camp outfit.'"

Obligations of Parties in Breach of Contract

According to the well established law, where one of two contracting parties breaches the contract, the other party may without liability refuse to fulfill his obligations. This important point of the law was upheld in the recent case of Hughes v. Rendle Corp., 171 N. E. 236.

The facts are that a company and the owner of motor vehicles entered into a contract by the terms of which the latter agreed to haul cement during the entire year for 85 cents per ton. The contract also provided that the company would pay the hauler in full within five days from final delivery of each shipment. The company paid only $400 of the hauler's bill of $568.23 for a shipment and the latter refused to transport other cement at the price of 85 cents per ton on the contention that the company had breached the contract by failure to pay the entire amount of $568.23 within five days. It is interesting to observe that the higher Court held the hauler not required to continue during the balance of the year to haul cement for the company. This Court said:

"Was the failure of the company to pay $168.23 of the $568.23, which the contract in express terms provided should be paid 'in full within five days from final delivery of each shipment' a breach so important as to warrant the hauler in refusing to deliver the remaining part of the cement? We think the failure of the company to pay so large a part of the total sum payable and due was not a trifling breach of the contract but was a substantial one which threw doubt upon the company's ability or disposition to make payments when due."

Dealer Not Entitled to Lien for Material Sold

The law is well established that one who furnishes material to a tenant for the improvement of real estate, and has no contractual relation with the tenant, is not entitled to a material man's lien.

For instance, in Stevens Supply Co. v. Stamm, 152 S. E. 602, a tenant, who had possession of property under a lease, contracted to improve it. The contractor purchased material and later the material man filed a mechanic's lien against the property. In holding the lien invalid, the Court said:

"A tenant cannot order work done upon the demised premises and charge the owner with the cost, unless there is some relation existing between him and his landlord other than that of lessor and lessee, by virtue of which the landlord expressly or impliedly consents to the contract under which the improvements are made. The mere knowledge of the landlord that the improvements are being made by the tenant is insufficient to charge him or his premises with their cost. He must either expressly or impliedly authorize the tenant to make the improvements for the former's benefit."

Insurance Problems Discussed

Fire Insurance Under Control of State Laws

One of the first things you learn about fire insurance is that it is not like merchandise. An insurance company has no goods on its shelves which you can feel or sample for quality. And, similarly, the buying and selling principles are different from the common rules of merchandising.

In general business it has always been accepted that "competition is the life of trade," and that the only way to make certain of honesty is to compel competition over every sale and never to let any trade group work together on price agreements.

Insurance, on the other hand, is fundamentally a coöperative business. It is possible for an insurance company to operate like a merchant; that is, to fix its own rates independently of its competitors and to charge every customer just as much as it can get out of him, regardless of what it charges any other customer. But a company which did business that way would not last long. Very soon some customers would find out that they had been discriminated against. Independent action by an insurance company simply will not work. The insurance business has a public interest, like the public utilities, and the more insurance companies coöperate in matters of rates and policy forms, the better is the public served.

Forty-Eight Laws

Probably the greatest handicap under which the insurance business suffers is an early decision of the United States supreme court, which held that insurance is not "interstate commerce" and therefore Congress has no power to enact laws to govern it. Interstate commerce means literally the exchange of merchandise, and since insurance is not merchandise it follows that the Federal government has no control over the insurance business. The result of this opinion of the supreme court has been that insurance can be governed only by state law. This gives us forty-eight sets of laws, all differing among themselves—some good, some weak and containing inconsistencies which sometimes are unfair to the citizens of certain states.

This conflict of state laws would bring about chaos except for one fortunate detail. The state of New York which, as the financial center of the country naturally is the focal point of the insurance business, has laid down a general rule that any company doing business in New York may do in other states only such things as it is allowed to do in New York. Thus, if an Illinois insurance company wants permission to do business in New York, it must virtually agree that it will do in Illinois only such things as would be permitted in New York. There is so much business in New York that practically all large companies want to be admitted to that state, and therefore most companies are compelled to abide by the New York laws. And since, by good luck, the New York laws are very good, it follows that the insurance business of the country is fairly well controlled by the laws of our greatest state.

A Test of Quality

I am often asked how a property owner can tell whether a certain insurance company is good or not. In answer, I might say that the simplest test is to find out whether that company is licensed in New York. This test may occasionally be unfair to some company, which, for private reasons, does not choose to operate in New York but, broadly speaking, it is fair to assume that any company licensed in New York must be pretty good. Conversely, if a company does business only in those states which have weak insurance laws, you would want additional proof as to its quality.

State regulation of insurance starts with the rating principles. This is just the opposite of merchandising. If two merchants offer you something at the same price you suspect there is a vicious agreement to hold up the price at your expense. But if two insurance companies offer you a different price for the same risk, you suspect that one or both of them must be wrong. In fact, forty-four states have basic statutes, known as "anti-discriminatory laws," which compel insurance companies to charge the same rate for all identical risks and which forbid rebating or any subterfuge to refund any portion of the standard premium.

Rate Discrimination

A law against discrimination in rate inevitably leads to having all fire insurance rates in each state made by one central bureau. For only in this way can the insurance companies be certain that they are legally charging every property owner a premium directly in proportion to his risk without any favoritism. In Texas this rating bureau is a branch of the state government itself: the state makes all the rates and insurance companies simply take what is handed out to them. In some of the most progressive states, like New York, the state permits insurance companies to organize their own bureaus but compels each company to stick strictly to the bureau rates. This is probably the best system. The private bureau can change its rules faster and be more flexible in keeping up-to-date than can a bureau that is part of the political machinery, and the public is fully protected as long as the state exercises a general supervision over the rates and rules.

The business of a rating bureau is to make inspections of all the commercial buildings in the state and to publish rates that are fair to everybody. In addition to this a great deal of coöperative work is done by the National Board of Fire Underwriters. This is a voluntary association of insurance companies, independent of any government, which sets the safety standards for fire insurance throughout the country. It therefore has two principal functions. It has a corps of inspectors who travel the country testing water pressure in city mains and judging the efficiency of fire departments. Their inspections result in the grading of fire-department and waterworks efficiencies, and this grading is taken into account in fixing the basis rates for all fire insurance in each city.

Safety Standards

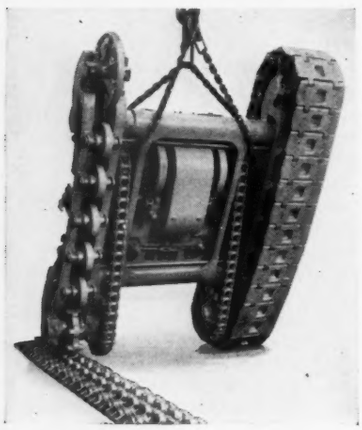
The National Board also publishes leaflets showing the standards for safety in connection with fire risks. If you want to know how to install an oil tank safely or how to hook up lightning rods or radios, you will find a simple set of rules in the files of the National Board. You will do well to keep this point in mind, because it is always easy to obtain these little pamphlets from any insurance agent. I have seen many unsafe conditions in industrial plants whose owners admitted that they did not know there were any rules on the subject but would gladly have done things the right way if they had known how. Whenever you have a new job of construction or installation in your plant, electrical or otherwise, find out whether the National Board may not have a safety code that will make your work simpler and better.

The other features of public control over fire-insurance companies have to do chiefly with guaranteeing the safety for policy holders. Most states have laws which limit the kinds of securities that insurance companies may invest in so that the assets cannot be lost through stock-market speculation. They also require that an insurance company cannot write more than a certain amount of insurance on any one risk, so that a single fire could not put it out of business. And some states prescribe by law a standard form of policy to prevent a company from inserting "jokers" at the expense of the insured. The standard policy law is a great protection against "wild cat" insurers, but it makes little difference in the case of the large stock companies because these use the standard New York policy throughout the country except where other state laws require minor variations.

New Machinery and Supplies

Equips Diesel Drag-line With New Crawler Track

The Bucyrus-Erie Co. of South Milwaukee, Wis., announces that its E-2 Diesel drag-line is now regularly equipped with a new style, improved, crawler-type mounting. This mounting comes with standard or special long belts and with special wide treads. The standard mounting has 27-in. treads giving an overall width of 10 ft. 6 in. with an overall length of 13 ft. 8½ in. and a bearing area of 51.9 sq. ft. There is also a long truck with 27-in. treads and this, as well as the standard truck, can ride on a flat car without removing the treads. The long truck with the 27-in. treads has the same width as the standard but is 15 ft. ¾ in. in overall length, with a bearing area of 57.9 sq. ft. Two styles of wide treads are also offered. The standard length truck with wide treads has an overall width



Crawler mounting on new Diesel drag-line.

of 11 ft. 8 in. with an overall length of 13 ft. 8½ in. and a bearing area of 63.3 sq. ft. This wide truck, wide-tread mounting also comes in the extra long size giving a bearing area of 70.8 sq. ft. with an overall width of 11 ft. 8 in. and an overall length of 15 ft. ¾ in.

The machine steers from the cab, having several interesting developments for more convenient steering. The new mounting is chain-driven, being somewhat similar to the crawler mounting used on the 1020 and 1030.

New Heavy-Duty Shovel Built for Quarry Work

A new shovel of 3-cu. yd. capacity, to be known as Type 4120, has just been introduced by the Marion Steam Shovel Co., Marion, O. The machine is of full-revolving, close-coupled design, and is electrically operated.

While it follows the basic and fundamental principles of Marion design,

New 3-cu. yd. shovel for heavy-duty work in quarries and mines.

Type 4120 incorporates a number of new and improved features for ease in operation and to produce high yardages at low unit costs. The crawlers are fully enclosed and the treads are of manganese steel to resist the abrasive action of the material composing the quarry floor. The lower frame is a sturdy one-piece steel casting and the propelling gears underneath the frame are fully enclosed.

The cast-steel upper frame is liberally proportioned and the machinery arrangement is such as to give maximum freedom in moving around the machinery deck. The outside type boom and the inside dipper handle are used and Marion's famous triple hitch is employed in the reeving of the hoist cable.

Actual observations made not only by Marion's own engineers and operators but as well by many visiting engineers from various parts of the country while the new shovel was being tested in actual digging operation, indicate particular interest in the following characteristics:

1. The ease of propelling and the speed of movement are outstandingly superior for machines of this size, and especially so in moving into or away from the face.
2. Vibration and noise practically do not exist, making it one of the quietest and most stable machines of any size ever made.
3. The tremendous power and pulling ability of the hoist, swing and crowd are especially noteworthy.

The new shovel is built for heavy-duty work in quarries and mines. Fine engineering and equally good construction have made it extraordinarily fast considering the strength and durability essential to a shovel of this type.

From the operator's standpoint the shovel is quite ideal. It hoists and swings with astounding quietness and crowds with a new efficiency. The cab is enclosed in glass and powerful spotlights add to the ultra modern equipment of this new excavator.

The new shovel will make its debut in South America. Two are now on the way to Chile to be used in the nitrate fields.

Twin Engines Employed on New Dumping Tractor

A new material-handling unit known as the Koehring Dumptor has been produced by the Material Equipment Corp. of Milwaukee, Wis. The machine, which combines in one unit the paramount features of a truck, tractor and bulldozer, is driven by two four-cylinder gasoline engines. This unique design is said to assure a continuous flow of power to accelerate and main-

Three materials-handling machines in action. Note twin engines on the one at the right.

tain speeds in all sorts of going. Steering clutches are eliminated, since each motor drives one of the crawler tracks, and all steering is done with the throttles.

The bearing pressure of the Dumptor on the ground is 9.8 lb. per sq. in. with an 8-ton load. A powerful hydraulic hoist dumps the body, the body being of heavy welded and riveted steel conservation, reinforced with 2-in. oak planks. The front-end dump permits the operator to see at all times where he is going and to back up after dumping a load, eliminating the necessity of turning on the dump with a load.

The capacity of the machine is 5 cu. yd. struck measure, with actual operating capacity (heaped) of 6½ cu. yd. or more.

There are four speeds forward and one reverse, giving the machine a speed of from one to 5¼ miles per hour.

Motor Maker Offers New Reconditioning Service

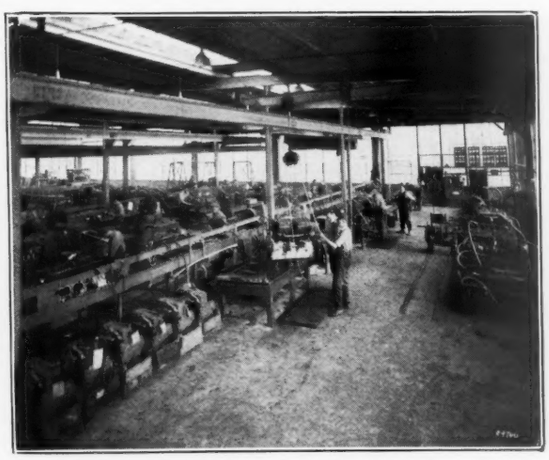
The Waukesha Motor Co. of Waukesha, Wis., has recently organized a novel service to owners and manufacturers by equipping a section of its new plant with complete manufacturing machinery for the reconditioning of engines that have been in use and require more than mere adjustment or ordinary minor repairs.

This department has all new machine tools for completely rebuilding engines of any model or size regardless of their age, and to the original standards of precision and accuracy that are current in production. Even a complete test and dynamometer run to check the performance after rebuilding is a part of the routine. It is said that this unique division has been able to so systematize their production methods that even engines that would appear hopeless to most maintenance men can be made equal to new in a period of not more than ten days after the work is started.

In the routine that an engine must engine follows which takes this rejuvenation treatment, the first move is a steam spray of washing compound which cleans the outside thoroughly and makes the preliminary inspection easy. If no damage appears in any of the parts, it is dis-assembled, the internal parts cleaned and then the real inspection with close gauges and indicators shows just what must be done to restore the engine to new condition.

New parts replace all worn or damaged pieces and if the engine was in operation before its return so that none of the major parts actually require replacement, the flat-rate cost carries no "extras."

Then comes the final inspection with another set of gauges and indicators, a running test followed by another inspection of the bearings, pistons and cylinders and a final horsepower test on a laboratory-type cradle dynamometer to make sure "it's as good as new." And then back to the job ready for another long period of trouble-free service.



Final inspection and test room in the motor-rebuilding division.

New Cooling Principle Used in Air Compressor

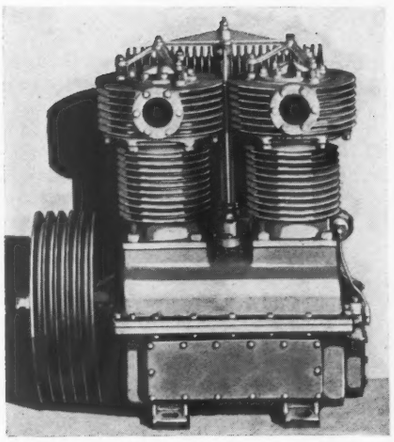
Davey air compressors, offered the trade this season after many years' exhaustive use in private work, are claimed to apply successfully for the first time the principle of air-cooling, as opposed to water-cooling generally practiced in compressor construction. They deliver 142 cu. ft. of air per minute.

Compressor heads and manifolds are of special aluminum alloy, cast with deep fins to give greater radiating area. Of all commercial metals, aluminum is the most rapid conductor of heat. High temperatures generated inside the compressor head are instantly passed through the aluminum walls, preventing any possible "piling-up" of heat within the compressor.

As a result, it is said that even after hours of steady running, one can lay his flat hand on the compressor heads.

With such low temperatures there can be no carbon formation, so Davey compressor valves never become fouled. Air pressures remain at constant high efficiency. Tools are kept comfortably cool and the output of work per man holds up at steady volume.

Due to the mechanical simplicity of this air-cooled construction, Davey compressors weigh on the average, nearly 1,000 lb. less than some others of corresponding capacity and price. So that they may be taken directly to the job, avoiding long air lines, they are furnished in four convenient mountings: one each for Caterpillar and McCormick-Deering tractors, one for trailers, and one for skids to be mounted on a light motor truck.



The new air-cooled compressor.

The tractor mountings have been very carefully engineered to avoid disturbing the operating balance of the tractor, and to permit its full use for drawbar and other work.

When thus mounted, the compressor is operated from a power takeoff from tractor motor. When mounted on trailers or skids, power is furnished by a Hercules motor, with transmission through two sets of V-type multiple belts which effectively absorb reverse torque action. Davey Compressor Co., Inc., Kent, Ohio, is the manufacturer and new illustrated literature is available by writing the sales department, mentioning PIT AND QUARRY.

Chains and Buckets of Wear-Resisting Metal

To meet more adequately the severe wear encountered by chains and buckets in the handling of abrasive materials, the Jeffrey Manufacturing Co., Columbus, O., after thorough laboratory and field tests, recently placed on the market a new line of Supermal chains and buckets.

The processing of malleable iron to give it combined characteristics of extreme hardness and toughness for special purposes has been a practice with the Jeffrey Co. for more than twenty years. The modern industrial requirements for metals of higher wearing value and greater strength caused them to apply the process more generally. Its use in connection with malleable chains and malleable buckets began five years ago. The perfected metal is now being offered to all industries under the registered trade name of Supermal.

The manufacturer states that Supermal embodies greater resistance to wear, higher tensile strength, and a higher elastic limit than heretofore developed in malleable iron. It cannot be touched on the surface with the flat of a file, yet it retains those desirable qualities of malleable iron—toughness and ductility. Although of

lesser practical importance, the qualities of higher tensile strength and higher elastic limit are comparable to the reserve speed and power in an

Link of the long-wearing chain.

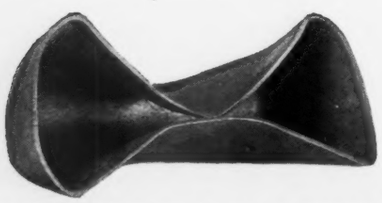
automobile. One seldom has occasion to make use of this reserve, but it is comforting to know that they are available in extreme emergencies.

The qualities of wear resistance, high tensile strength and high elastic limit

Despite their extreme hardness the buckets may be punched or drilled.

found in Supermal chains, compare very favorably with like qualities of manganese steel chains. Yet the cost of Supermal is only little more than ordinary malleable chains and substantially less than that of manganese chains.

The accompanying illustrations of Supermal buckets illustrate the two very unusual physical properties—great wear resistance and ductility.



A bucket sledged out of shape, yet unbroken.

These buckets can be pounded and distorted far beyond any working requirements before breaking and can be drilled and punched.

The new chain is recommended for conveyors, elevators and chain drives subject to abrasive or gritty conditions.

New Flexible Coupling Uses Aluminum Flanges

The Ajax Flexible Coupling Co., Westfield, N. Y., has recently placed on the market a new coupling called the Type E. It is of the pin-and-rubber-bushing type and is a modification of the standard Ajax Type A, which has been successfully used for ten years.

The Type E coupling is in reality a special coupling of limited size, designed for purposes of economy on special applications, such as centrifugal pumps, small speed reducers, fans, motor-generator sets, and in fact all jobs at motor speeds within the bore and load limitations of the coupling.

The new coupling is made with aluminum-alloy flanges, hardened and ground alloy-steel drive studs and specially-compounded rubber bushings firmly cemented to hard bronze bearings by a new process. Its weight is only 2 lb. per coupling, due to the use of aluminum flanges 4 in. in outside diameter by 2 1/16 in. overall length, available at seven and one-half horsepower, 1,750 r.p.m. on steady loads, with 1½-in. maximum bore or special keyways.

The flexible coupling is said to be noiseless, free from vibration, easy to

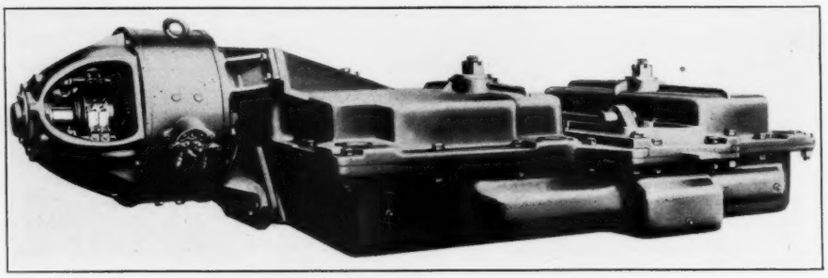
Flexible coupling using aluminum parts.

assemble, sets up no backlash and provides free end float. Its smooth, aluminum construction and modernistic design add to the appearance of any machine of which it is a part.

Develops New Shaker-Conveyor Drive

The design of efficient shaker conveyor drives has always been quite a troublesome problem, largely because of the difficulty of securing the proper relation between acceleration and retardation with any of the accepted mechanisms. In the new drive developed by the Conveyor Sales Co., Inc., of New York, the difficulty has been overcome by the application of a new principle, with results that are decidedly interesting. The drive, known as the C-20, is primarily built for use in underground workings, but its field of usefulness is actually much wider, including sand-and-gravel or crushed-rock plants, power houses or, in fact, any industrial plant where bulk granular material is to be conveyed for comparatively short distances. One of the outstanding features of the drive is its simplicity, and another its compactness. The overall dimensions are: height 24¾ in., width 84½ in., plus from 20⅞ to 35⅝ in. for the motor, and length 44 in. The weight installed is 6,400 lb. As a result it can be installed practically regardless of space limitations.

The principle of operation is comparatively simple, but is so designed as to provide exactly the correct relation between acceleration velocity and that of retardation. The mechanism consists of a gear train and cross arm which convert the rotary motion of the motor into reciprocating motion of a cross head which is connected to the conveyor trough, with a minimum loss of energy. As a matter of fact, the drive requires from 30 to 50 per cent less power, and is 50 per cent more efficient than the ordinary types. The mechanism is totally enclosed in a heavy cast-steel case, which serves also as an oil reservoir, and is provided with three separate covers, so that access to any part of the mechanism is quite easy. Four sockets are cast into the top of the case for the reception of ratchet-holding jacks, and, since the drive straddles the conveyor, there are no twisting strains set upon the jacks that are likely to loosen them. The driving motor is bracket mounted, the necessary pads being cast integral with the case. Motors are rated 20 hp. and may be either d.c. or a.c. per-



Roller-bearing-equipped drive for shaker conveyors.

missible or open, as required. Automatic remote control with time limit accelleration and full protection against overload and under voltage is provided for the motor.

The construction of the drive is substantially as follows. A pinion on the motor drives a bevel ring gear, which is mounted on the same vertical shaft as a main driving pinion. This pinion in turn drives the main gears, which are also mounted on vertical shafts, one directly, and the other through an idler gear. The gears are made from heat-treated cast steel, with stub cut teeth, and all shafts are mounted in Timken bearings, the mountings being such as to hold the various shafts in rigid alignment. Each main gear is provided with a crank, or wrist pin, which fits in a block sliding in a cross arm located under the gears, the cross arm being supported by circular ribs cast in the base and machined to the requisite smoothness. The cross arm in turn is pivoted on a crosshead pin, set in the crosshead, which slides in bronze guides set in the base. The crosshead is pinned to the conveyor trough and both crosshead and crosshead pin are provided with bronze bushings. The whole bottom of the case serves as a reservoir for lubricant, and lubrication of the various bearings is provided by an oil pump located in the case, and driven by an eccentric machined in the primary drive shaft. Thus a constant circulation of clean oil is assured.

With the foregoing as a basis, the operation of the drive is easily explained. The rotary motion of the gears is transposed into reciprocatory motion of the cross head by the action of the cross arm working on the wrist pins in the gears. By virtue of the arrangement used, the peak velocity of the forward stroke comes beyond 120 deg. of the full revolution, and the peak of the reverse, or retarding stroke before 240 deg., which is the ideal condition for drives of this type. Consequently there is no waste of power and no tendency for retrograde slipping of the material in the trough. The maximum length of the stroke is 11 inches, but it is possible to adjust it quite simply by altering the angular relation of the wrist pin and shaft on one gear with that of the wrist pin and shaft on the other. Altogether fourteen different strokes, between 11 in. and zero, are available for any setting of the drive, that is, whether it is running right or left handed with respect to the orientation of the motor side to the conveyor trough.

Clever Conveyor Loads Sacks to Freight Cars

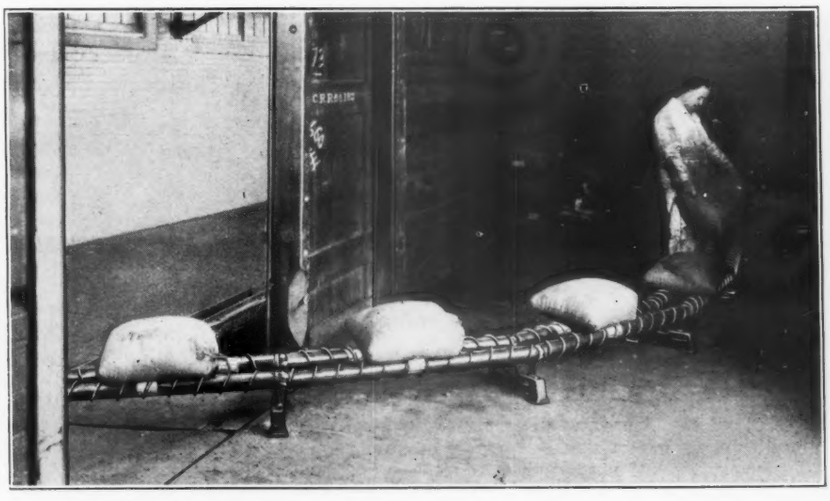
Traffic and transportation men will be interested in a new car loading and unloading equipment which is said to make remarkable reductions in the cost of loading freight cars with almost any type of packaged freight and comparable cost reductions in the unloading process.

It consists of eight short sections added to the end of a standard Clark TwinVeyor. The TwinVeyor itself consists of a series of dual sections of spiral tubes turned toward each other by a power head. It is used extensively in conveying, elevating and tiering commodities in bags, bales, bundles, crates and cartons.

The operation of the loading assembly is as follows: The standard TwinVeyor line extends to the car door. The addition of four short dual sections extends the line into the car, makes the right angle turn to the right and, in operation, delivers the freight to the far end of the car, waist high. As the end of the car is filled, the end section of the TwinVeyor is removed. The line is successively shortened until one end of the car is completely loaded. Attachment to the four other sections of the car loading kit extends the line to the left-hand end of the car and is similarly shortened as loading proceeds. With both ends loaded, the center section is loaded from the end of the TwinVeyor.

Transporting the right- and left-hand tubes in the assembly reverses the flow of material, making the unloading operation as easy as loading. The dual tube sections are easily handled. Attachment or removal of a section takes one minute. The speed of operation depends to some degree upon the size, weight and shape of packages. The bagged material being handled in the operation shown in the accompanying photographs is loaded or unloaded at the rate of 30 bags per minute. The TwinVeyor line will convey these bags 90 ft. per minute up a 15-per cent grade.

By the use of this equipment, manufactured by the Clark Tructractor Co., Battle Creek, Michigan, packaged freight flows quickly from car to storage or point of use. Unloading costs are said to be cut markedly and demurrage charges reduced.

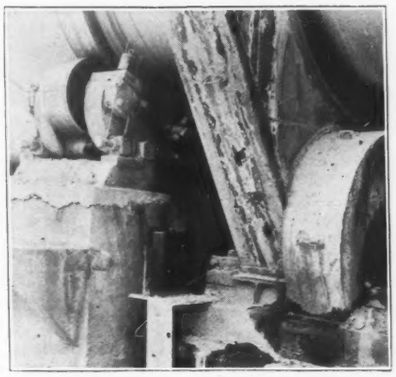


Conveyor loading sacked material to freight cars.

Control System Assures Uniform Feed to Kilns

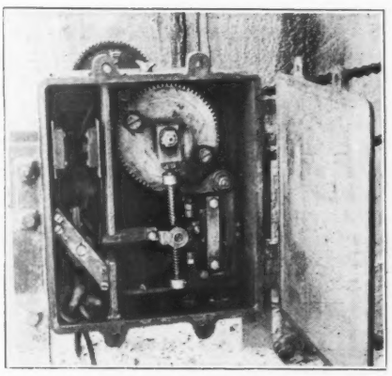
The Bendy feed-control system, recently introduced, assures a constant and uniform feed to a cement kiln per kiln revolution. If the kiln speed is reduced or increased the speed of the feeder is changed proportionally and automatically.

This results in maintaining kiln operation at its maximum efficiency.



Control switch at kiln drive.

The operators of the plant can determine the most efficient feed at which



Close-up view of control switch on feed-control system.

the kiln should be operated and this feed regulation is then removed from the hands of the burner. Further-

more, different burners cannot change the feed to suit their ideas. Also the burner has only the one variable speed to control—that is, the speed of the kiln. In addition to these advantages, the control system seems to show some slight saving in coal. However, this is to be expected as the kiln is operated at its maximum efficiency at all times.

The control system accomplishes this purpose by means of two double-throw, single-pole quick-acting, mechanical switches, one at the kiln drive and the other at the feeder drive. The feeder is stopped for a few seconds by the feeder switch and started by the kiln switch. The feeder is stopped and started by means of a magnetic clutch so that a constant-speed motor can be used at the feeder. By maintaining a complete cycle in approximately two minutes of time, the load in the kiln is uniform. Furthermore, the system maintains the proportion of the kiln and feeder speeds with exact mathematical accuracy. The system is being manufactured by the Manitowoc Engineering Works, Manitowoc, Wis.

Importance of Pumice as a Concrete Aggregate and as Trass

By W. A. T. AGARD

PUMICESTONE, well known to the German cement factories for many years, is a product consisting of about 30 per cent trass or pumice, a volcanic rock high in silica, and 70 per cent ordinary Portland cement, blended together in the cement mill.

The German government requires large quantities of trass cement in its hydraulic structures and has used it successfully since 1889, with the finding that trass cement has an increased strength due to the chemical combination of the excess lime hydrate of ordinary cement with the added silica into a hard water-resisting silicate of lime. This reaction fills the pores and small voids that are generally present in ordinary concrete, lowers the setting temperature and reduces the tendency of the concrete to crack.

Pumice as an aggregate, is superior to ordinary sand, gravel or cinders, as the pumice is practically inert, except as to its advantage in taking up the excess lime hydrate of the cement.

Where sound-absorbing acoustic qualities, thermal insulation, or resistance to fire and most acids are demanded, pumice is an acknowledged necessity and particularly recommended for curtain walls and plasters for hospitals, office buildings, hotels and theatres.

Pumicestone aggregate weighs about 50 per cent as much as ordinary sand-and-gravel aggregate, its natural weight being between 30 and 40 lb. per cu. ft., depending upon its fineness. In a concrete mix of 1 to 5, it weighs less than 77 lb. per cu. ft. in 28 days, whereas a similar mixture with cinders weighs more than 100 lb. or, with ordinary sand and gravel, 150 lb. per cu. ft.

With such diminished weights and its resistance to extreme weather conditions, it proves most valuable in class A buildings — skyscrapers in which steel structures hold the weight —with the resultant safety due to less weight on the foundations. Its use provides a saving in steel of perhaps 25 per cent, or the possibility of a higher structure. The thinking architect appreciates these facts. So will the road-builder who understands its resistance to cracking.

The U. S. Government architects have been in the habit of specifying cinders for light-weight concrete in Washington, D. C., because cinders are handy in the East; but, in the West where cinders are scarce, pumicestone has been substituted with beneficial results.

Italian pumicestone is produced by convict labor on the island of Lapori at a ridiculously low figure—something like 10 cents per day for the convicts. The freight to New York by steamer is nominal, perhaps as low as $5 per ton. There is, therefore, no excuse for the exorbitant figure demanded for this product in New York or Chicago. The freight from the Pacific Coast to Chicago alone is $14 per ton, and the average cost of producing in the West is $5. If Congress could be induced to put a $15-per-ton duty on foreign pumice, our American product would have a chance for fair competition in the East, since the Italian pumicestone is no better, if it is as good.

Pumice deposit in Oregon.

The result of such a protection would not advance the price of Italian pumicestone in the New York market one cent; in fact, a tariff might reduce the price, due to the competition. The only difference would be that Uncle Sam would pocket the profit instead of give it to Mussolini. Had the Forny bill not been accepted by Congress as a blanket compromise, Congress would certainly have placed a duty of $20 per ton on foreign pumice.

There are many deposits of pumicestone in the different western states, of various grades. One excellent deposit, illustrated here, is in Oregon so located that it could be economically worked and transported. Here the material requires no hauling or rehandling, but can be steam-shoveled from a 30-ft. bank directly into cars alongside a main-line track.

With the suggested governmental protection, the pumicestone production of the West might keep at work several hundred men who are now unemployed.

Names Representatives for New Turbine Mixer

Turbo-Mixer Corp., New York, N. Y., has appointed the National Supply Corp. of that city to represent the corporation in England, Roumania and the Argentine for all products of their manufacture for the petroleum industry.

Western Engineering Co., San Francisco, will represent Turbo-Mixer Corp. in the section of California north of the Tehachapi mountains.

Road Envoys Presented with Souvenir Booklet

Each delegate to the International Road Congress who recently visited the works of the Cleveland Rock Drill Co. in Cleveland, O., was presented with a large, beautifully bound booklet filled with pictures which show the application of Cleveland machines to road and street building, contracting, quarrying and mining. A greeting, on the opening page, was printed in English, French, German and Spanish.

Sues to Dissolve Sand-Operating Partnership

Suit to dissolve the partnership operating the Saulsbury Sand Co. of Chattanooga, Tenn., has been filed in chancery court by Mrs. R. E. Barnes, one of the partners, against Albert G. Hines, the other partner. Mrs. Barnes alleged a breach of contract had been made by Hines.

Mrs. Barnes asked the court to dissolve the partnership, sell the property of the company and distribute the proceeds to the partners.

Manufacturers' Publications

Each publication listed below contains information of interest to nonmetallic mineral producers. Readers may obtain, without charge—except where a price may be stated—and without obligation, copies of any of these publications by writing directly to the manufacturers who publish them. Please mention PIT AND QUARRY *when writing.*

Alloy Steels

Buyers' Guide—Fall, 1930, Issue. 16 p. (The International Nickel Co., Inc., New York, N. Y.) A handy reference book for operators. Gives names and addresses of firms handling or producing nickel alloy-steel products.

Belting

It's Grip That Solves the Problem. 2 p., 2 ill. (Worthington Pump & Machinery Corp., Harrison, N. J.) Describes the multiple-V-belt drive made by this concern in collaboration with the Goodyear Tire & Rubber Co., and illustrates its application.

Burners, Oil

Hauck Venturi Triple Atomizing Low Pressure Oil Burners. 4 p., 11 ill. (Bulletin 403. Hauck Mfg. Co., Brooklyn, N. Y.) A leaflet in colors describing and illustrating an industrial oil burner with three stages of atomization for all grades of fuel oil from 8 deg. Baumé up, with air from ½- to 2-lb. pressure.

Drilling

General Catalog. 44 p. Illustrated. (The Cleveland Rock Drill Co., Cleveland, O.) Describes and illustrates the complete line of drills and drilling accessories manufactured by this company.

Electrical Equipment

Industrial Electric Heating Equipment. 100 p. Illustrated. (Catalogue No. 247. The Westinghouse Electric & Manufacturing Co., Industrial Heating Division, Mansfield, O.) A comprehensive catalogue of industrial heating equipment which contains many valuable data.

Fuels

Gas Heat—The Prime Essential of Modern Manufacture. 32 p., illustrated. (The American Gas Assn., New York, N. Y.) Describes and illustrates the uses of gas in industry for all purposes where heat is required.

Material Handling

Modern Material Handling Equipment. 4 p., 27 ill. (Bulletin 77. The Robins Conveying Belt Co., New York, N. Y.) Describes and illustrates the application of this concern's equipment to the pit and quarry industries.

Power Plant Materials—Handling Tools. 8 p., 13 ill. (Book No. 1228-A. Link-Belt Co., Chicago, Ill.) Describes and illustrates equipment for screening, condensing water and handling coal and ashes.

Shovels

The 120-B, 4-Yard Shovel. 24 p., 34 ill. (Bulletin D-1203. Bucyrus-Erie Co., South Milwaukee, Wis.) Describes and illustrates the rugged construction and rock-digging ability of this type of 4-cu. yd. shovel made by this concern. Supplied with either electric or steam power.

Tractors

"The Thirty Drives It." 1 p., 1 ill. (*The Caterpillar Magazine*, Issue 54. Caterpillar Tractor Co., Peoria, Ill.) Describes and illustrates a Pioneer portable crushing, screening and loading plant near Hotchkiss, Colo., in which a 30-hp. tractor supplies all the power.

Welding

Rego Welding and Cutting Apparatus. (The Bastian-Blessing Co., Chicago, Ill.) A loose-leaf catalogue describing and illustrating various equipment and accessories for welding and cutting.

Roebling Welding Wire. 40 p., 22 ill. (John A. Roebling's Sons Co., Trenton, N. J.) Describes and illustrates a complete line of welding wire for both acetylene and electric welding.

Welding and Cutting Equipment. 24 p. Illustrated. (K-G Welding & Cutting Co., New York, N. Y.) A catalogue of torches, pressure regulators, gauges, and other welding accessories, as well as complete outfits for plant welding operations.

Welding Wire Research. 12 p., 12 ill. (Page Steel & Wire Co., New York, N. Y.) Describes and illustrates the painstaking efforts which go into the manufacture of wire for making weld deposits. Contains information on proper welding current and gas flames to insure good results.

Wire Rope

"The Proper Care of Wire Rope." 2 p., 3 ill. (*The P & H Crowd* for November-December, 1930. Harnischfeger Corp., Milwaukee, Wis.) Describes and illustrates things to do and things not to do to obtain efficient, economical service from wire rope.

New Catalogues Describe Latest Plant Equipment

Stephens-Adamson Mfg. Co. of Aurora, Illinois, has just printed two 72-page catalogues describing conveying, screening and washing equipment. One catalogue is devoted exclusively to the crushed-stone industry while the second features equipment for sand and gravel plants.

The books are alike in that they specialize in recent developments in plant arrangement and new units for producing and handling high-grade specification material.

The opening section of each book has good suggestions for the survey that should always be made not only in designing new plants, but in keeping present plants up to date. The material includes a consideration of the deposit, market requirements, future developments and the best methods for producing the required products.

A number of pages are given over to successful arrangements that have been used recently in plants ranging in size up to the great crushing plants capable of producing, storing and shipping hundreds of thousands of tons, both by rail and by water.

Several pages of both photographs and drawings show the latest types of self-unloading boats that are being used to cut the freight costs between cities on the Great Lakes.

Either of or both the catalogues will be sent to those making their requests to the Stephens-Adamson Mfg. Co., Catalogue Department, Aurora, Ill.

Tennessee Gravel Plant Installs New Equipment

The Memphis Stone & Gravel Co. at its plant one and a half miles east of Camden, Tenn., has recently installed new and modern machinery. During the summer months the concern was unable to take care of all orders despite having operated night and day. The new equipment will enable it to load 75 cars of gravel each 10-hour shift.

Material will be graded according to specifications for the various road projects that are being constructed over the western section of Tennessee and Mississippi. W. T. Gibson and R. L. Swafford have charge of the plant.

New Corporations

ROXBURY WASHED SAND & GRAVEL, INC., Ledgewood, N. J. 1,000 shares com.

PROFITS ISLAND GRAVEL CO., INC., Canal Bank Bldg., New Orleans, La. G. B. W. Lymann. $200,000.

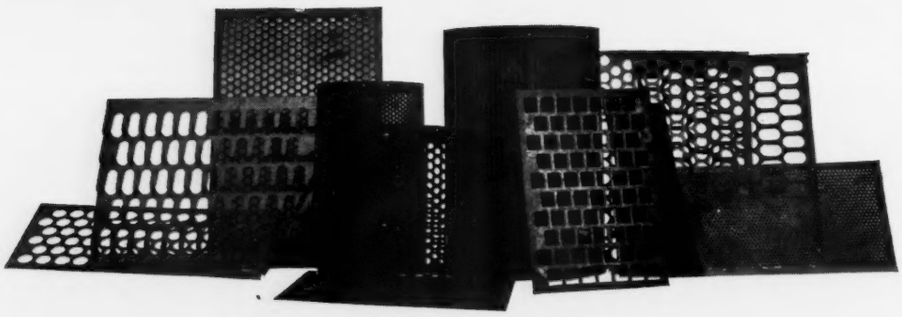
PEERLESS SAND & GRAVEL CO., LTD., 719 Stock Exchange Bldg., Vancouver, B. C., Can. $100,000.

HUFTY ROCK ASPHALT CO., Kansas City, Mo. M. R. Hufty, Liberal, Mo.

ABLEMAN GRANITE & SANDSTONE CO., Ableman, Wis. Wm. H. Gall, Jr.; G. H. Volz, both of Ableman, Wis.; Bert C. Hintz, Madison.

NEW JERSEY MARBLE PRODUCTS CORP., 43 South Main St., Phillipsburg, N. J. F. E. Getchell, president, R. G. Jolly, vice president-treasurer, C. L. Pilger, secretary. 150,000 shares. To quarry marble and grind talc and similar products.

JOHN CLARK CO., Rockville, Minn. $200,000 and 7,500 shares com. To produce sand and gravel and quarry stone.



For Best Results Use the Morrow!

THE Morrow Perforated Metal Screens for sizing and preparing coal, sand, gravel, stone, and other bulk materials are made by a company specializing in screening machinery.

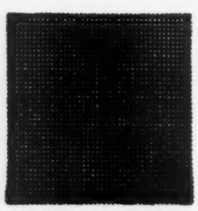
Behind our recommendations to you lies years of experience which has taught us the best line of screens to use for a given work.

You are offered such sizes and shapes of perforations which we know to be best suited to the screening of bulk materials.

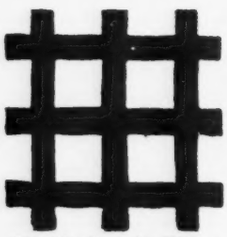
If our wide stock does not suit your particular purpose, we will make special plates to your specifications. Our factory is equipped to roll or flange plates to order, and will punch marginal holes as directed.

Write for full particulars.

THE MORROW MFG. CO. QUALITY MORROW SERVICE WELLSTON - OHIO



40 Mesh; .0135 Wire



2½ Mesh; .105 Wire

12 Mesh; .047 Wire

SERVICE!

is the one thought behind every operation in the manufacture of—

"CLEVELAND" Double-Crimped Wire Cloth

Uniform fineness and long service will be assured by its use in screening SAND, GRAVEL, CRUSHED STONE AND CEMENT.

Large stock always on hand; special mesh manufactured to suit requirements at right prices

THE CLEVELAND WIRE CLOTH & MFG. CO.

3579 East 78th Street, Cleveland, Ohio

Shaking Extra Weight Costs Extra Money

The Universal Vibrating Screen is so simply constructed that it does not have to shake a lot of unnecessary weight and machinery in order to do an efficient screening job. It confines the vibrating action to the material. That's why it costs you less to buy, and less to operate.

You may think that because the Universal is so low in price it won't stand the gaff—won't handle your screening problem. In that case we would like to refer you to the many, many satisfied users of Universal Screens everywhere. 46.3% of our business is repeat orders—a pretty good argument in favor of Universal Screening Efficiency.

Get acquainted with Universal Screens. "Money Cannot Buy Better."

UNIVERSAL VIBRATING SCREEN CO.

RACINE ~ ~ WISCONSIN